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THE EFFECTS OF ECONOMIC CONDITIONS ON OVERALL AIR FORCE OFFICER ATTRITION

by

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December 1987

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The Affects of Economic Conditions on Overall Air Force Officer Attrition

by

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First Lieutenant, United States Air Force
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Air Force planners need to accurately predict officer losses in order to effectively control: the overall force size, promotion rates, augmentation and recruiting needs. Officer losses are influenced by a variety of behavioral and economic factors. This research identified the overall civilian unemployment rate as the major economic factor affecting Air Force officer losses.

However, including the unemployment rate with the "in system" data (the number of separation/retirement applications already accepted) failed to increase the accuracy of the model currently used by the Air Force.

Recommendations are to further explore the cause of the serial correlation found in the time series data and to model the causal relationships that cause officers to leave the Air Force.

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TABLE OF CONTENTS

I. INTRODUCTION ---------------------------------- 1

- A. BACKGROUND ---------------------------------- 1
- B. OBJECTIVES ---------------------------------- 2
- C. RESEARCH QUESTIONS -------------------------- 3
- D. LIMITATIONS, SCOPE AND ASSUMPTIONS OF RESEARCH ---------------------------------- 3
- E. LITERATURE REVIEW --------------------------- 6
- F. EXPECTED OUTCOME ---------------------------- 7
- G. ORGANIZATION OF STUDY ----------------------- 8

II. LITERATURE REVIEW ----------------------------- 9

- A. BRES AND ROWE ------------------------------- 9
- B. ESMANN -------------------------------------- 10
- C. KOSTIUK ------------------------------------- 12
- D. DREMSTEDT ----------------------------------- 14

III. BACKGROUND ------------------------------------ 19

- A. RELATED ISSUES ------------------------------ 19
- B. CURRENT "ON TRACK" SYSTEM ------------------- 21

IV. METHODOLOGY ----------------------------------- 24

- A. DATA COLLECTION ----------------------------- 24
- B. STRUCTURING THE DATA ------------------------ 28
- C. ANALYSIS ------------------------------------ 30

V. DATA ANALYSIS/INTERPRETATION ------------------- 32

- A. INITIAL ANALYSIS ---------------------------- 32
- B. MODEL SPECIFICATION ------------------------- 36

C. MODEL TESTING ---------------------------------- 40

D. INTERPRETATION -------------------------------- 40

VI. CONCLUSION AND RECOMMENDATION ------------------- 45

A. CONCLUSION ------------------------------------ 45

B. RECOMMENDATION -------------------------------- 46

APPENDIX A: HISTORICAL ATTRITION DATA --------------- 47

APPENDIX B: HISTORICAL ECONOMIC DATA FILES USED IN ANALYSIS ------------------------------ 58

APPENDIX C: ATTRITION AND ECONOMIC DATA AS SEQUENCED IN REGRESSION ANALYSIS --------- 63

APPENDIX D: PEARSON CORRELATION TEST OF ECONOMIC VARIABLES CONSIDERED IN ANALYSIS --------- 77

APPENDIX E: REGRESSION RESULTS ---------------------- 83

APPENDIX F: MODEL PROJECTIONS OF TEST PERIOD DATA ---- 97

LIST OF REFERENCES ------------------------------------ 111

BIBLIOGRAPHY -- 112

INITIAL DISTRIBUTION LIST ----------------------------- 113

LIST OF TABLES

1 COMPARISON OF 24 VS 51 MONTHLY OBSERVATIONS ------- 34

2 STATISTICS AFTER INCLUSION OF Q1, Q2 AND Q3 DUMMY VARIABLES ------------------------------------ 35

3 REGRESSION RESULTS ---------------------------------- 38

4 MODEL PROJECTIONS VS ACTUAL ATTRITION ------------- 41

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I. INTRODUCTION

A. BACKGROUND

To effectively manage policies related to accession, promotion, and other issues within the officer corps, Air Force planners require a high degree of accuracy in predicting officer losses. Internal personnel flows, such as transfers and promotions, are greatly influenced by external personnel flows, such as retirement and separations. Vacancies created by the external flows need to be filled by personnel from within the system, through promotion, or by the recruitment of personnel from outside the system. Great care needs to be given to accession and promotion policies. These two policies are the Air Forces' most effective personnel management tools.

Accession and promotion policies are subject to change depending upon the overall manning structure authorization. The manning structure is affected by three main factors: officer losses, changes in Congressional authorization, and the federal budget. The latter two factors, Congressional authorization and the federal budget, determine Air Force policy. Officer losses however, are affected by Air Force policy.

Obtaining Air Force officers at the entry level can take several years of lead time. The Air Force Academy, for instance, requires a minimum of 4 years lead time, Air Force Reserve Officer Training Corps (AFROTC) a minimum of 2 years and Officer Training School (OTS) a minimum of 6 months.

Insufficient lead time can result in reacting too late to crises. Crisis reactive personnel policies may result in morale problems among the officer corps. These problems can lead to excessive losses or even abnormally high retention, both of which can have adverse effects on long term manpower planning. However, pro-active personnel policies lead to effective and efficient personnel management. With the proper personnel policies, perhaps the military could eliminate the need for such personnel actions as Reductions in Force (RIF), which are caused by unforeseen manning overages.

The ability to accurately project officer attrition, in advance, provides Air Force leadership the information and sufficient lead time necessary to compensate for these losses and provide for a stable officer corps.

B. OBJECTIVES

The purpose of this thesis was to develop a model capable of accurately predicting Air Force Officer losses. To accomplish this, historical retirement and separations data needed to be analyzed. This was done to identify and analyze any trends and patterns that may exist in the data.

In addition to the separation and retirement trend data, an economic indicator that patterned the attrition rate was sought. There is a definite and clear negative relationship between officer losses and the state of the U.S. economy. The best economic predictor of officer losses appears to be the overall unemployment rate. As the national unemployment rate increases, the number of officers leaving the Air Force decreases. Correspondingly, when the unemployment rate decreases, Air Force officers are more willing to leave, due to the increased availability of good civilian jobs.

Succinctly put, I hoped to have developed a model, using linear regression analysis, that will accurately and in a timely manner project the number of Air Force Officers leaving the Air Force, within the current fiscal year.

C. RESEARCH QUESTIONS

Can future Air Force Officer losses be accurately projected by using historical data? Furthermore, how does the current state of the economy, as measured by the unemployment rate, affect the decisions of individuals to separate from the U.S. Air Force Officer Corps?

D. LIMITATIONS, SCOPE AND ASSUMPTIONS OF RESEARCH

1. Limitations

Present Air Force policy requires officers to give a minimum of 180 days notice prior to separation or retirement. However, recent officer reductions mandated by the Gramm-Rudman Bill have caused liberal granting of waivers, allowing personnel to attrite with less than the required 6 months notice. This may have affected the last few monthly observations in the data set. For this reason, careful analysis and consideration will be given to the time period from March to June 1987.

The data set for this project contains separate files of different categories of officers. When the task of recording the separation and retirement actions began, the starting times were different for each file. As a result, the files were different lengths. Therefore, the historical data base for this analysis required alteration. A complete data set was available and used for the period from March 1982 through May 1987.

Regression analysis will be used to identify a national economic indicator(s) that exhibits trends similar to that of Air Force Officer attrition. Monthly economic data is readily available in the monthly issues of the U.S. Government publication Economic Indicators.

Both sets of variables, historical and economic, will be incorporated into one model, enabling the Air Force to project officer losses based on historical trends and on current economic conditions.

2. Scope

This model is intended to accurately project, by month, the total number of officer personnel leaving the Air Force, before the end of the fiscal year. This projection model will not attempt to identify or to use behavioral traits or other similar types of explanatory variables. This thesis focuses on the trends of historical attrition and economic conditions. The data will be used to support a model that projects Air Force officer losses from 1 to 12 months in advance, focusing on the 6 to 12 month projections. These projections will be done for the Non-Rated Line (NRL) category of Air Force officers eligible for separation and/or retirement, regardless of their job specialty, Air Force Specialty Code (AFSC), within the Air Force.

The NRL category is the largest and most homogeneous group of officers in the Air Force. This group is comprised of all Air Force Officers excluding Rated Officers; pilots, navigators, and strategic missile launch control officers. In my opinion, the motives for rated officers exiting the military are different than the NRL officers. Rated officers respond more to the actions of the airline industry. If the airline industry is in a period of growth, rated officers will exit the military. The periods of growth or decline in the airline industry are not necessarily the same for the economy as a whole. For this reason, Rated Officers are excluded from this study.

3. Assumptions

This model is only one of many the Air Force uses to forecast personnel end strengths and the effects of policy changes on Air Force military manpower. One similar model used by the Air Force is the Air Force Computerized Officer Projection System (AFCOPS). The AFCOPS model is primarily used for making officer loss projections 2 years in advance. It is a Monte Carlo type model, using probabilities of past losses to predict future losses. The model's primary purpose is for determining the effects of budget changes on officer attrition.[1]

Another type of officer loss estimation model used by the Air Force is the Defense Officer Personnel Management System (DOPMS). The DOPMS model is a Markov Chain type model using cells and information flow between the cells. This model is primarily used for determining the effects of policy changes relative to manpower levels. The DOPMS model is capable of making projections in 5 year increments.[2]

As part of the Air Force's "On Track System" (a system specifically designed to produce current/up-to-date information) this model's purpose is to arrive at a total number of officer losses each month, up to the end of the current fiscal year.

E. LITERATURE REVIEW

Other loss projection models have been developed by other branches of the military, but the structure of the other models is greatly different from the model Air Force is currently using. There is, however, one thread of continuity between the other models and the model I am now investigating, namely unemployment rates. The overall unemployment rate is the most significant economic influence in the separation of officers from the military.[3] According to other studies, the unemployment rates have the most explanatory power when they precede actual attrition by 12 months.[4]

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[1] Dremstedt, Statistical Techniques for Determining Officer Separation and Retirement Trends in the United States Air Force, Master's Thesis, Air Force Institute of Technology, 1982, p. 2.

[2] Ibid., p. 3.

F. EXPECTED OUTCOME

At the end of my research I expect to find that the nation-wide overall unemployment rate is a significant factor in predicting the attrition of Air Force Officers. The relationship between the unemployment rate and attrition should be negative. By this I mean as the unemployment rate increases, attrition in the form of separation and retirement should decrease. Based on my literature review, I anticipate the unemployment rate will lead attrition by one year. This should apply to both separation and retirement actions.

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[3] William John Esmann, Marine Officer Attrition Model, Master's Thesis, Naval Postgraduate School, Monterey, California, 1984, p. 23.

[4] Thomas F. Wilson, "Engineering Retention and the Economy," Student Report, Air Command and Staff College, 1982, p. 14.

G. ORGANIZATION OF STUDY

The remainder of this thesis will cover an extensive literature review followed by an explanation of the structure of the data base. The analysis will begin with an clarification of the methodology used, succeeded by the actual analysis of retirement and separation data of Non-Rated Line (NRL) officers.

The empirical work will begin with the analysis of retirement actions using linear regression. The separation data will be analyzed secondly. Each section will close with a summary of findings for that particular section. The final chapter will summarize all the conclusions and make recommendations for further analysis in the area of loss projection models.

II. LITERATURE REVIEW

Other researchers have previously investigated the relationship between attrition in the military and the state of the U.S. economy. This chapter reviews of some of the studies that pertain to the attrition of officers from the military.

A. BRES AND ROWE

Edward Bres and Murray Rowe, 1979, compared various methods of attrition forecasting with a system being used by the Navy OP-130 in 1979. At that time OP-130 was using a weighted average of historical loss in a Markov flow matrix. Bres and Rowe gave a relatively good and brief explanation of various time series analysis methodologies. The interpretation included examples of each of the models, with their respective rationale and particular weaknesses. In addition to time series, two regression approaches were evaluated, ordinary least squares (OLS) and minimum absolute deviation (MAD) regression.

These techniques were evaluated by comparing their mean absolute errors. The procedure with the lower error was deemed to be the best. This was done for each cell in the Navy's promotion flow model. The cells were broken down by grade and years of service (YOS) cohorts.

The authors found that a 3-year autoregressive time series model produced significantly better results than the historical weighted average model used by the Navy at that time. However, comparison of the models is better done by measuring the predictability of the model rather than by comparing the mean absolute errors.

B. ESMANN

William Esmann, 1984, performed a study on Marine Corps Officer attrition. His intent was to quantify the connection between the state of the economy and Marine Corps Officer attrition. He separated the data by grade to categorize his loss predictions. He used a survey of all ranks of Marine Corps Officers in order to identify the major determinants of attrition. His survey revealed 3 major classes of variables: (1) military pay, (2) the economy, and (3) promotion potential.

When considering the economic explanatory variables, Esmann used various measures of economic activity to explain officer attrition. His choices were (1) managerial unemployment, (2) professional/technical unemployment, (3) consumer price index, and (4) gross national product, GNP. In the author's opinion (based on the definition of managerial and professional categories of unemployment provided by the Department of Labor), the managerial and professional/technical areas of unemployment are the closest functional areas for military officers to consider when making their decision whether to stay or leave the military.

Esmann did not use the annualized cost of leaving, ACOL, model in his study. He felt there was an "intuitive" error built into the ACOL model. Specifically, the ACOL model relates voluntary attrition to the military/civilian pay ratio. Esmann interpreted this to mean that an individual will choose to leave the military if he/she perceives compensation better in the civilian sector than in the military. This interpretation is not correct.

The error he perceived is the under-emphasis of variables like patriotism, pride in service, and the individual's satisfaction with the military lifestyle, as significant factors relating to attrition. His opinion was based on his "regressions of attrition on civilian to military pay ratios which showed little explanatory power."[1]

Esmann's perception of the ACOL model was incorrect. The ACOL model does account for the taste an individual has towards military life.

Esmann argued that the economy did not cause a person to leave the military. His opinion was that an individual decided whether to separate from the military for reasons other than economic. The economy helped decide the timing of the separation but not the separation decision itself. His opinion was based on a series of interviews he had with

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[1] Esmann, p. 11.

Headquarters Marine Corps career planning officers. These officers correspond with hundreds of officers daily and, in his opinion, have good feedback on the reasons for officer attrition.

Esmann then used his selected explanatory variables (managerial/administrative unemployment, professional/ technical unemployment, gross unemployment, and military/civilian pay ratio) in a time series analysis model. His resulting model showed that gross unemployment was the most significant economic factor in determining officer attrition.

Esmann noted that most attrition occurs in the summer months. The reason is not necessarily economic, but personal. Most commissioning programs assess officers in the summer months and also, most military parents choose to make changes in summer when their children are out of school.

C. KOSTIUK

Peter F. Kostiuk, 1986, looked at the effects of civilian employment rates on the attrition of Marine Corps Officers. The data on 20,000 active duty officers were obtained from Headquarters Marine Corps. The information was categorized into cells by community (general job classification), grade, years commissioned service (YCS), and fiscal year. His study was done on an annual basis.

The explanatory variables chosen were (1) historical attrition rates during the FY 77 to FY 84 time period, and (2) historical unemployment rates during the same time. The unemployment rates were lagged six months because of a requirement in the Marine Corps to give six month notice prior to leaving the service. Kostiuk believed that six months prior was the time when the person made up his/her mind whether to stay in the Marine Corps or return to the civilian sector. The selection of the 6 month lag seemed to be made arbitrarily, without testing. However, the reason is probably due to the 6 month notice that is required of all officers prior to any form of voluntary attrition.

Kostiuk chose the Logit form of regression. It is used for categorical response type variables (e.g., separating from the military?, Yes or No).

The researcher separated the last 12 months of data from the rest of the data bank for later comparison. After analysis, Kostiuk compared his predictions with the actual results during that time, FY 84. His comparison of the results was deficient because he compared raw numbers, without calculating percent errors. Raw numbers have little meaning alone.

Kostiuk concluded that unemployment rates do affect attrition rates. However, he made certain observations about the effects of unemployment rates with respect to an individual's grade and Years Commissioned Service (YCS).

According to Kostiuk, unemployment had no affect on the 0- 4 YCS group since they were serving their initial obligation. The 5-11 YCS group was the most affected by the unemployment rates. Little change was observed for the 12-16 YCS group, and the 17-20+ group was not affected at all by changes in unemployment rates. This is completely understandable due to the career implications of added YCS and the structure of the service's retirement program.

D. DREMSTEDT

In his graduate thesis, Albert Dremstedt, 1983, developed a model for officer loss estimation based on historical trends. Simultaneously he developed models using linear regression and Box-Jenkins time series analysis. His purpose was to predict/forecast officer losses in the Air Force so that accurate monthly and end of Fiscal Year (FY) strength levels could be estimated. He separated the losses into two categories. One category was persons separating from the Air Force and the other category was individuals retiring from the Air Force.

1. Separations Analysis

Dremstedt did regression analysis of separation patterns using stepwise regression. (Generally, stepwise regression is not the best way to analyze data. The stepwise method selects the variables that explain the most variance in the dependent variable, whether they intuitively make sense or not.) Data was separated into two types of

Dates of Separation (DOS), one with a separation program designator (SPD) and one without SPD. DOS with SPD is defined as an officer career separation (a separation greater than one year after the officer's initial obligation). This type of separation requires a minimum of 180 days notification prior to the desired separation. DOS without SPD is defined as an officer eligible for separation immediately following (or within one year) of his/her initial obligation. Both types of data were used as independent variables in linear regression. Actual losses were used as the dependent variable.

The data for the analysis came from an Air Force report called Fiscal Year Computerized Officer Projection System, (FYCOPS). The FYCOPS report was designed to facilitate the tracking and control of normal separations. Basically, this model keeps track of the personnel eligible for separation/retirement and displays the number by month. The model also keeps track of the career personnel who have already submitted their applications for separation/retirement.

The linear regression R^2s ranged from .99 for a one-month projection to .75 for the 12-month projection. This sounds abnormally high until you understand the variables used. The independent variables are those eligible for separation or those who have already applied for separation. The dependent variable is the actual accomplished separations. Given this type of information, a high R^2 is understandable.

During the model's testing phase, Dremstedt noticed that the model was consistently over-estimating each month. He felt this was attributable to the large size of the data base. He also noted that if the data base was too large (measured by the numbers of observations), the model would react to change too slowly. On the other hand, if the number of observations was too small, outliers would have a significant impact and might bias the outcome. Hence, Dremstedt searched for the optimal number of monthly observations to use.

He ran separate regression analyses of each data set with its maximum number of observations (depending on the data set in question) taking one observation away each time, until a minimum of 12 observations was reached. He then plotted the adjusted R^2s and standard deviations for each regression output. Comparing these values graphically, he noticed the best R^2 and the least standard deviation occurred at 23-24 months. To keep the period of time in whole years, he settled on 24 months as the optimal number of observations for accurate linear projections.

In testing the model, Dremstedt noted a 16.9% error rate. To reduce this rate, he changed the way data was entered into the regression. Instead of using 24 months of historical data for each of the 12 monthly predictions, he used the previous predictions as part of the input data. In other words, he predicted the first month, then used 23 months of historical data and the first month's prediction as the 24 month observations for the second month's prediction. He continued this until he had predicted the entire year. The error rate fell to 9.6%, a 43.2% decrease. However, he cautioned this was done with only one sample. Before implementation, further analysis needs to be completed.

In Dremstedt's time series analysis of separations, he used an Autoregressive Integrated Moving Average (ARIMA) process model using the Box-Jenkins technique. The results were not as reliable as the linear form of regression.

2. Retirement Analysis

When analyzing retirement data, Dremstedt conducted a similar procedure. First, linear regression and then time-series analysis. The two main independent variables used were mandatory and voluntary retirements. Mandatory retirement consisted of disability, high year of tenure restrictions (an Air Force policy that separates officers who have reached their maximum allowable time in service at their current grade), and promotion failure (those officers twice non-selected for promotion to the next higher grade). He also used a third independent variable, time. This variable gave an order to the observations and reduced the amount of serial correlation.

Due to retirement policy changes in the late 1970s, the data were limited to just a few years. Once suitable data were obtained, the R^2s ranged from .99 for a one month projection to .82 for a 12 month projection.

The linear retirement model was tested in the same manner as the linear separations model. The first tests were done with 24 historical observations. The second tests were done with historical observations mixed with the prior monthly projections from the model. In this case no significant difference was noticed between the two testing methods. At this point, Dremstedt recommended future research to determine the optimal number of observations to use.

The time series analysis of retirements was completed the same way as the separations. Dremstedt's conclusion was that linear regression proved more accurate than time series analysis in the projection of officer losses in the Air Force.

III. BACKGROUND

A. RELATED ISSUES

The Air Force uses different types of manpower prediction models for different purposes. Three different systems are currently being used. One system deals with the affects of current or proposed policy changes on future manpower strengths and requirements. The second system deals with the effects of proposed budget changes on future manpower needs. The third system, the "On Track System," is intended to model current manpower strengths (within the current fiscal year) in light of the current environment. The model I am modifying is being used in the "On Track System." A brief explanation of the other projection models would enhance the level of understanding of the Air Force manpower system.

1. AFCOPS

The model simulating the effects of budget changes is the Air Force Computerized Officer Projection System (AFCOPS). AFCOPS is a stochastic, Monte Carlo type model that uses the records of officers without using their names. The model uses data from each officer's personnel record, and through linear regression is able to determine, using random probabilities, if the officer is likely to stay or leave the military. Loss rates are based on a 1 or 2 year history. The model has built-in procedures to compensate for promotion and augmentation. The model also "ages" the officer as he/she progresses through his/her career.

The model is able to age the force by using the personal attributes of an officer. For example, if an officer is an O-3, rated, married, with 2 dependents, and is 28 years old, he/she occupies a location (cell) in a flow matrix. As time passes the officer is aged and promoted if necessary. The model is not concerned with whether the officer has a SPD code (separation program designator, accepted separation application) or not; it just considers probabilities.

The model automatically considers officers eligible for promotion, in the promotion zone, but it will not promote them. In other words, the officer will remain in his matrix location as an O-3, but will not be promoted to O-4. However, it will automatically consider an officer separated at the appropriate time if he/she is twice passed over for promotion.

The AFCOPS model makes predictions for End of Fiscal Year (EOFY) and for the next 5 years as well. The primary purpose of the projections is for estimating how the officer corps will respond to changes in monetary incentives brought about by changes in the budget.

2. DOPMS

The Defense Officer Personnel Management System (DOPMS) is a model that projects the effects of policy changes on future officer manpower strengths. This model is a Markov Chain type, using cellular locations of information pertaining to the officer's years of service (YOS), grade, rating, and whether the officer is regular or reserve. The data is accumulated without the names of the individuals.

A five year history is used to obtain the probability (rate) of transition from one cell location to another. DOPMS also uses economic factors and Annualized Cost of Leaving (ACOL) information in making its projections. DOPMS makes two year projections.

3. On Track System

This system is designed to make projections within the current fiscal year using current data. This up-to-date information is just as vital as, if not more important than, the longer range projections. To meet the proper end strength authorizations set by Congress, Air Force planners require up-to-date information.

B. CURRENT "ON TRACK" SYSTEM

The current model used by the Air Force Military Personnel Center for projecting EOFY officer end strengths is a linear regression of the data provided by the FYCOPS report (in system data) with the historical attrition data. Each month the last 24 months data (actual attrition numbers; both separations and retirements, as well as the number of officers eligible to separate and the number of officers whose retirement and separation applications were in the personnel system) are analyzed by Ordinary Least Squares (OLS) regression.

The FYCOPS figures (the number of officers eligible or applied) for each data file are then inserted in the estimated regression equation. Separation and retirement projections for that particular month and category of officer are calculated as follows:

$$\text{Separations}_t = \text{constant} + B_1 \times \text{NSPD}_t + B_2 \times \text{SPD}_t$$

$$\text{Retirements}_t = \text{constant} + B_1 \times \text{MAND}_t + B_2 \times \text{VOL}_t$$

- SPD is the number of officers who have already applied for and been accepted for separation.
- NSPD is the number of officers on their initial commitment who are eligible for separation.
- MAND is the number of officers who must retire because they have achieved their high year of tenure, i.e., the maximum years of service allowable at their current grade.
- VOL is the number of officers eligible for retirement and who have applied.
- Constants, B_1, and B_2, are the parameters estimated by the regression analysis.

This procedure is done for 24 monthly observations and for the total data file. The data files range from a minimum of 51 monthly observations to a maximum of 106 monthly observations. The varied lengths of the different data files is due to the different starting times for data collection. The data were initially collected for reasons other than input for the Officer Loss Projection model.

Once an estimate from each model (the 24 month projection and total data month projection) is obtained, the two are compared. If the two are similar, the number of losses may be considered good. I say "may" because the model has not been making accurate predictions in the last one to two years. The individual working with this model has realized that the model underpredicts early in the year and then catches up later, as the time remaining in the fiscal year becomes shorter (less than 6 months). Consequently, when an estimate (greater than 6 months in the future) is obtained, this individual adjusts the number upward to a (hopefully) more accurate estimate.

For this very reason, I chose to improve this model. The model, as it is currently used, lacks the ability to accurately predict beyond 6 months. Six months is the minimum notice required, by Air Force policy, for requested attrition actions. As a result, the less than six month predictions do not vary much from what is already known and in the Air Force's automated personnel system.

IV. METHODOLOGY

A. DATA COLLECTION

1. Historical Attrition Data

The attrition related data for this thesis were obtained from the Air Force Military Personnel Center (AFMPC) at Randolph Air Force Base, San Antonio, Texas. The data consisted of five categories of Air Force Officers:

1. Line officers (LIN)--all officers excluding Chaplains, Legal (JAG) and Medical officers.
2. Non-Rated Line officers (NRL)
3. Pilots (PLT)
4. Navigators (NAV)
5. Officers in general (OFF).

Within each major category of officer, there are two categories of attrition, retirement and separation. Within each retirement and separation file are twelve sub-files. These sub-files are listings of the number of officers who have already left the Air Force in a given month, and the number of officers known eligible and applied for retirement/separation a certain number of months prior to their actual retirement/separation.

a. Separation Files

The data within the separation files consists of the number of officers who actually separated in a particular month, the number of officers with a separation program designator (SPD code), and the number of officers without a separation program designator (NSPD). An SPD code is projected for a career officer (an officer in service at least one year past his/her initial commitment) once an application for separation has been accepted. NSPD is the variable name for the number of officers whose initial commitment will expire in a particular month, and have not yet taken action to terminate or extend their term of service. In other words, they are eligible for separation but their intentions are unknown. The files are formed as depicted below.

1st Column--ACC--number of accomplished separations in a month.

2nd Column--NSPD--number of officers eligible to separate.

3rd Column--SPD--number of career officers projected to separate.

b. Retirement

The retirement files consist of the actual number of officers who retired in a month, the known number of officers voluntarily retiring, and the known number of officers who must retire for mandatory reasons, X months prior to the actual retirement. The file is structured in the following manner.

1st Column--ACC--number of accomplished retirements

2nd Column--VOL--number of voluntary retirements

3rd Column--MAND--number of officers retiring for mandatory reasons

4th Column-SEQ--a number given to sequence the data*
*(this data was not used in my analysis).

These files are labelled by category of officer and by the number of months difference between the separation/retirement action and the time the data is known in the system. For example, LINSEP12 is a file of Line officers who separated in a given month (e.g., January) and the known number of officers intending to separate (already filed, SPD) or the number of officers known eligible for separation (have not filed, NSPD) 12 months prior to the attrition month (e.g., the preceding January. To cite another example, NRLRET9 is a file of Non-Rated Line officers who retired in a given month (for example, September), and the known number of officers intending to retire (voluntarily applied, VOL, or mandatorily projected, MAND) 9 months prior (January) to the (September) attrition month.

The data for these files are supplied by an Air Force counting system: the Fiscal Year Computerized Officer Projection System (FYCOPS). This system tracks officers throughout their careers. From the point of initial assession, the system determines when an officer is eligible for separation or retirement. Through the automated personnel system within the Air Force, the system is updated and keeps track of when an officer is eligible for, or has actually requested, separation (been given a SPD code) or retirement. These numbers are then used as input into the Officer Loss Projection model for end of fiscal year estimations. The structure and actual data files used in this analysis can be seen in Appendix A.

2. Historical Economic Data

The economic variables initially chosen for evaluation in my thesis were:

1) Composite Index of 12 Leading Economic Indicators, Business Conditions Digest, U.S. Department of Commerce, Bureau of Economic Analysis.

2) Number of National Help-wanted Advertisements, Employment and Earnings, U.S. Department of Labor, Bureau of Labor Statistics.

3) National Unemployment Rate, Employment and Earnings, U.S. Department of Labor, Bureau of Labor Statistics.

* All of the above statistics were seasonally adjusted.

I selected these particular economic measures because of their ease of access and understanding to the general public. Most officers have an understanding of what these statistics imply for their future civilian job opportunities. Therefore, some relationship is expected between these variables and officer attrition. In addition to the variables listed above I created variables of change for unemployment and leading indicators. These additional variables were created by determining the amount of change from the month prior to the current month's statistic. These data may be found in Appendix B.

B. STRUCTURING THE DATA

The data for this analysis required merging the "In System" data, provided by FYCOPS, and the economic data. Each "In System" data file consisted of three columns. The first column contained the actual number of personnel separated/retired in a month. I called this variable ACC, for accomplished attrition. In the separations files, the second column contained data on the number of personnel eligible for separation at the end of their initial commitment. This variable is called NSPD, no separation program designator. The third column in the separations file contained data on the number of career officers (officers with more than one year of service past their initial commitment) that had requested to be separated from the Air Force. This variable is called SPD. This group of officers requires a separation program designator to separate from the Air Force. In the retirement files, the second column contained data on how many officers had submitted requests for voluntary retirement: I called this variable VOL. The third column in the retirement data file is the number of officers who must retire due to promotion passover, high year of tenure, etc. This variable is called Mand for mandatory.

The way the "In System" data is sequenced is of special importance. Each file, whether it is SEP6 or RET6, matches the actual attrition with the data that was known (in the system) 6 months prior to the month of attrition.

When the economic variables were merged with the In System data, each file had a different group of unemployment rates. Each file required unemployment rates which corresponded to the data available at X months prior to the attrition month. For example, the SEP6 file for June, has the actual number of officers that separated in June (ACC), the number of officers (on their initial commitment) known in January (six months prior) to be eligible for separation in June (NSPD), and the number of officers who had already applied and were accepted for separation (SPD) in June, known in January. The economic variable, therefore, had to be sequenced with the data known in the months prior.

In the above case, the unemployment rate from November was used. November was the most current monthly data available in the first week of January when the projection needed to be made. Although December had passed, the first week of January would not provide sufficient time to allow the statistic to be compiled and published. Therefore, November was the most current monthly unemployment rate available.

The sequencing resulted in a data file with the actual attrition in one month, the known, In System, data from X months prior (depending on which file was being used) and the monthly unemployment rate 2 months prior to that. The complete data files used in this analysis are reproduced in Appendix C.

C. ANALYSIS

The analysis was performed on the Naval Postgraduate School's IBM main-frame computer utilizing the SPSSX software package. The first step was to compute a Pearson Correlation Coefficient Matrix of all variables, independent and dependent. The Pearson Correlation is a measure of the linear relationship between the variables.

In ordinary least squares (OLS) regression, it is assumed that there exists no exact linear relationship among the independent variables. When the correlation between two explanatory variables is stronger than the correlation between an explanatory variable and the dependent variable multicollinearity exists. This is generally the result of the double counting of a causal relationship, and results in misspecification of the regression model. This high degree of correlation between the independent variables precluded the use of more than one economic variable at a time in the model. The help-wanted advertisements and leading economic indicators variables had a lesser effect on the model, so these variables were dropped from further analysis.

I chose to inspect the months 6, 9 and 12 in both retirement and separation. On the average, the coefficients showed a high negative relationship between help-wanted advertising (HW) and the unemployment rate (UN), between HW and the leading economic indicators (IND) and between UN and IND (see Appendix D.) To clarify, as the unemployment rate decreases, the number of help wanted advertisements increases. This is because the employers find it necessary to advertise more to attract the additional workers needed from the decreasing pool of eligible workers.

Exploratory linear regression to check the significance of each independent variable on the dependent variable, (using t tests) indicated that the unemployment rate was the most significant of all the explanatory variables. Therefore, I reduced the list of economic variables down to only the overall civilian unemployment rate. The other economic variables did not demonstrate a significant (.05 or better level) relationship to the historical attrition data.

V. DATA ANALYSIS/INTERPRETATION

The loss projection model currently being used by the Air Force is not predicting accurately beyond six months. Accuracy within the six month time period is due to the current Air Force policy requiring officers to submit their retirement/separation intentions at least six months prior to the desired date of termination. Once the decision has been made and the application for retirement/separation is accepted, there is little change.

Economic variables have no effect on the separation decision within the 6 month time period. However, beyond the six month period, economic variables may play a part in the officer's retirement/separation decision. Therefore, my analysis focused on the 6-12 month loss projections.

A. INITIAL ANALYSIS

As I mentioned in the previous chapter, the overall National Unemployment Rate was determined to be the most significant economic variable. This was reinforced by my review of previous studies relating economic conditions to attrition.

I performed OLS regression of the independent variables: unemployment rate (UN), and the two variables for each of the two types of files, retirement and separation. The independent variables used in separation analysis are the number of officers eligible to separate during a given month (NSPD), and the number of officers who have already applied for separation and been given a separation program designator (SPD) for that same month. The independent variables for the retirement file consists of: the number of officers accepted for voluntary retirement (VOL), and the number of officers who must mandatorily retire (MAND) during a given month. The regression was initially performed on the 6, 9, and 12 month projection data files. I performed this regression on the entire data file (51 monthly observations), and the most recent 24 monthly observations (excluding my test data). The models were specified as written below. Table 1 contains the results of those regressions.

$$\text{Retirement (ACC)} = \text{Constant} + A_1 * \text{VOL} + A_2 * \text{MAND} + A_3 * \text{UN} + e_A \text{ (Random Error)}$$

$$\text{Separation (ACC)} = \text{Constant} + B_1 * \text{NSPD} + B_2 * \text{SPD} + B_3 * \text{UN} + e_B \text{ (Random Error)}$$

The Durbin-Watson statistic can be used to test for serial correlation. Serial correlation occurs in time-series data when the errors (e_A and e_B) in adjacent observations are correlated. This violates the assumption of linear regression that each error is independently drawn (i.e., that each variable is random and drawn from a

TABLE 1

COMPARISON OF 24 vs 51 MONTHLY OBSERVATIONS

	24 Months		51 Months	
Projection	R^2	Durbin-Watson	R^2	Durbin-Watson
Ret6	.90	1.1	.87	1.1
Ret9	.72	1.3	.64	.94
Ret12	.69	.94	.50	.77
Sep6	.66	.81	.59	.75
Sep9	.49	.84	.38	.65
Sep12	.54	.86	.42	.72

distribution with an expected value of zero, constant variance, and zero covariances).

If no serial correlation is present, the test statistic equals two. If positive correlation exists, the statistic will be below two. Alternatively, if negative correlation is present the test statistic will be greater than two. As can be seen from the above table, there is strong evidence of positive correlation in the regression equations.

In order to reduce the serial correlation in the equations, I sought a seasonal adjustment. I chose to identify the months of the calendar year as quarters. Each quarter of the year was identified beginning with January, February, and March being quarter 1, April, May, and June were coded as quarter 2, July, August, and September were coded as quarter 3, and October, November and December were the default months and not coded. Depending on which month was being projected Q1, Q2 or Q3 was used in the monthly projection. Including these newly created dummy variables (Q1, Q2, Q3) into the equation greatly reduced the amount of serial correlation. The models were specified as written below. Table 2 reflects the new statistics.

$$\text{Retirements (ACC)} = \text{Constant} + A_1 * \text{VOL} + A_2 * \text{MAND} + A_3 * \text{UN} + d_1 * Q1 + d_2 * Q2 + d_3 * Q3 + e_R$$

$$\text{Separations (ACC)} = \text{Constant} + B_1 * \text{NSPD} + B_2 * \text{SPD} + B_3 * \text{UN} + d_1 * Q1 + d_2 * Q2 + d_3 * Q3 + e_S$$

TABLE 2

STATISTICS AFTER INCLUSION OF Q1, Q2 AND Q3 DUMMY VARIABLES

	24 Months		51 Months	
Projection	R^2	Durbin-Watson	R^2	Durbin-Watson
Ret6	.93	2.10	.91	1.37
Ret9	.86	2.48	.75	1.25
Ret12	.86	2.37	.63	1.01
Sep6	.93	2.29	.70	1.17
Sep9	.85	2.20	.58	1.28
Sep12	.77	2.30	.60	1.42

As can be seen from Table 2, the serial correlation has been greatly reduced, especially for the 24 month models. The 24 month models provide a better fit, as measured by R^2, and also show less serial correlation. Considering these results, the information obtained from the literature review relative to the amount of historical observations to use, and the fact that the 1 through 6 month projections are made with 24 monthly observations, I remained with the 24 month model for the projections.

Most other studies of this type induced a time lag of 6-12 months between the economic condition and attrition. In this situation, no time lag appeared to be needed. The policy of six month notice prior to any form of attrition seemed to take care of that. In addition, the data base is structured so that each data file has a lag built in. For example, Sep9 is a file containing data on separations in a given month, and the data that was "in system" (known) nine months prior to the separation. Hence the time lags are already built into the current system.

B. MODEL SPECIFICATION

Different forms of regression were tested in an attempt to properly specify the regression model. They were: straight linear (all variables independent and dependent in their normal form), log-linear (log of the dependent variable with normal linear independent variables), linear-log (normal linear dependent variable with the log of all independent variables), and log-log (log of both independent and dependent variables). The best model (in terms of highest adjusted R^2 and Durbin-Watson statistic closest to two) was the OLS linear/linear model.

Following this, I analyzed all remaining projection months, seven, eight, 10 and 11. The actual regression analyses and the resulting coefficients can be found in Appendix E.

As can be seen in Table 3, the T tests show that whether the coefficients are significant at the .05 level depends on which model (monthly projection) is used. If I were developing a single model for a specific behavior, the variables with the insignificant T values would have been removed from consideration. However, my analysis requires the simultaneous development of 14 separate models. In one model the variable Q1 may be significant but in another it may not.

It is important to keep continuity in the entire system of models. In other words, all models within this system should be based upon the same set of variables. In attempting to develop one type of model for all applications, it was necessary to keep all variables in each equation. Each independent variable is significant in at least one monthly projection.

TABLE 3

REGRESSION RESULTS

RETIREMENT

Monthly Projection	Constant	Mand	Vol	Un	Q1	Q2	Q3	Adj R2	F	D.W.
Ret6	-411.5	1.77	1.61	60.5	1	32.7	-17	0.94	64.3	2.4
t values	-3.1	2.6	8.2	3.4	0.07	1.6	-1.2			
Ret7	-293.1	-0.18	1.83	48.5	8.5	80.7	-12.3	0.84	21.2	3.1
t values	-1.5	-0.09	4.2	1.9	0.4	2.8	-0.5			
Ret8	-236.4	-0.25	2.3	39.9	9.4	95	-5.8	0.82	18.5	2.7
t values	-1.4	-0.25	4.2	1.9	0.4	3	-0.2			
Ret9	-196.4	-1.5	2.7	33.8	20.9	111.7	10	0.82	19.4	2.7
t values	-1.9	-8.2	3.8	2.4	0.9	4.2	0.4			
Ret10	-252.2	-1.9	3.2	41.9	11	112.2	6.2	0.82	19.2	2.4
t values	-1.9	-0.9	3.6	2.3	0.5	4	0.26			
Ret11	86.6	3.8	4.4	-6.5	-0.1	98.2	23.8	0.86	24.7	1.6
t values	0.76	3	4.4	-0.4	0	4	1.1			
Ret12	1.84	2.08	5.4	6.7	-3.7	113.9	19	0.78	14.5	2.5
t values	0.01	1.4	2.6	0.4	-0.1	3.6	0.7			

TABLE 3 - (CONTINUED)

SEPARATION

Monthly Projection	Constant	Nspd	Spd	Un	Q1	Q2	Q3	Adj R2	F	D.W.
Sep6	46	0.256	0.84	-4	8.8	31	7.1	0.91	41	2.36
t values	1.4	8.4	5.5	-0.9	2.4	8	1.8			
Sep7	66.8	0.22	0.68	-5.4	7.2	31.7	7.8	0.84	21.5	2.25
t values	1.5	6.3	2.7	-0.9	1.4	6.2	1.5			
Sep8	87.9	0.21	0.6	-7.8	4.6	33	6.3	0.84	21.5	2.44
t values	2.4	6.4	1.9	-1.5	0.95	6.5	1.1			
Sep9	121.8	0.24	0.69	-12.8	2.7	34.6	5.1	0.86	24.7	2.5
t values	4	6.6	1.4	-3	0.6	7.2	0.9			
Sep10	32.7	0.14	1.7	-1.1	0.73	41.2	16.2	0.75	12.7	2.4
t values	1.1	4	2.5	-0.2	0.12	6.2	2.4			
Sep11	136.8	0.17	0.42	-14	5	32.9	10.7	0.84	21.7	2.05
t values	4.5	6.2	0.6	-3.3	1	6.4	1.9			
Sep12	114.9	0.15	0.65	-10.8	4.5	27.8	13.1	0.75	12.6	2.1
t values	3.6	4.1	0.75	-2.3	0.7	4.1	1.9			

C. MODEL TESTING

The true test of any model is its predictive capability. In gathering the data for this analysis, I set aside the last year of data for testing purposes. In this case, the months June 1986 through May 1987 were the test months.

Taking the estimated values of the constants and the associated coefficients for each monthly projection model, I matched up the historical attrition data and the historical economic data with the appropriate variables. The actual mathematical calculations were performed using Lotus 123 spreadsheets. Appendix F contains the actual spreadsheets. Each spreadsheet contains the projection compared with the actual results for that particular model and month.

Table 4 shows the projections for each month compared with the actual attrition for that month. The error rate was determined by taking the absolute value of the difference between the model's projection and the actual attrition for a given month, then summing these values and dividing by the number of projections made, in this case twelve. The error rate for the entire system of models (6-12 month projections, retirement and separation) is 23.8 percent. This error rate is unacceptable.

D. INTERPRETATION

My initial objective of this analysis was to link economic conditions with the attrition of Air Force officers in hopes of improving the accuracy of loss projections. It

TABLE 4

MODEL PROJECTIONS VS ACTUAL ATTRITION

Retirement

Monthly Projection	Jun 86	Jul	Aug	Sep	Oct	Nov
Ret6	156	192	179	214	300	174
Ret7	210	157	181	191	243	188
Ret8	230	170	189	192	228	179
Ret9	250	195	218	220	249	172
Ret10	247	151	184	176	229	149
Ret11	263	215	251	217	246	149
Ret12	292	213	223	174	242	122
Actual Attrition	159	262	246	233	283	178

	Dec	Jan 87	Feb	Mar	Apr	May
Ret6	87	122	118	96	184	123
Ret7	94	157	145	126	213	181
Ret8	102	158	155	135	244	181
Ret9	115	185	181	147	284	211
Ret10	77	168	163	137	281	207
Ret11	110	177	182	135	312	207
Ret12	80	112	167	132	338	231
Actual Attrition	87	126	156	134	173	111

ERROR RATES

Ret6--15.3%
Ret7--22.4%
Ret8--24.1%
Ret9--22.7%
Ret10--31.9%
Ret11--31.1%
Ret12 - 25.5%
Overall Error Rate--24.7%

TABLE 4 - (CONTINUED)

Separation

Monthly Projection	Jun 86	Jul	Aug	Sep	Oct	Nov
Sep6	109	65	89	71	98	50
Sep7	105	62	70	70	100	56
Sep8	105	58	66	68	101	63
Sep9	119	60	66	69	108	74
Sep10	124	71	71	70	78	55
Sep11	103	63	70	72	97	69
Sep12	98	67	69	78	93	66
Actual Attrition	102	82	124	105	138	75

	Dec	Jan 87	Feb	Mar	Apr	May
Sep6	49	77	67	67	81	84
Sep7	55	64	61	73	86	81
Sep8	58	64	56	60	95	87
Sep9	66	68	60	55	100	95
Sep10	57	59	47	43	92	92
Sep11	67	86	65	61	96	90
Sep12	64	82	68	62	88	88
Actual Attrition	79	81	55	72	71	72

ERROR RATES

Sep6-21.1% Sep7-22.1% Sep8-23.1%
Sep9-23.8% Sep10-29.2% Sep11-21.0%
Sep12-20.1%

Overall Error Rate-22.9%

appears that this has not happened. There are months where the models performed very well, a difference of less than 10 people on a 12 month projection, but that type of result is not consistent.

In general, the model tends to under-predict. At about the eighth monthly prediction in each model, the model's projections get very close to the actual attrition. There still seems to be some effect of serial correlation. The errors appear to take on a wave-like pattern. However, having tested the system only over a twelve month period may not have revealed the entire cyclical effect.

This may be due to the changes in the long term condition of the economy or other factors such as the changes in the tax laws. However, there may be a more significant reason for the lack of statistical significance of the unemployment rate on Air Force officer attrition.

The "in system" data obtained from FYCOPS is an aggregate number of officers, regardless of their grade or time in service. As was mentioned in the literature review chapter of this thesis, officers of different grades and times in service separate for different reasons. Some groups of officers react differently to changes in the unemployment rate than others do. According to Kostiuk (1986) the unemployment rate had little, if any, effect on the attrition of officers in the 0-4 and 12 and over years of service groups. In my opinion, this aggregation of officer data contributed to the model's inability to make accurate projections using unemployment rates.

VI. CONCLUSION AND RECOMMENDATION

A. CONCLUSION

This analysis has resulted in conclusions different than expected. I originally had hoped to increase the accuracy of the six to 12 month officer loss estimates by including an economic variable with the historical attrition data. The reason for this was partially based on the review of the work of other researchers, and on an intuition that economic conditions (measured primarily by the overall civilian unemployment rate) affect attrition rates within the military services. In this analysis, however, the inclusion of unemployment data did not enhance the accuracy of loss projections.

The reason for this, I believe, is three fold. First, there appears to be some form of serial correlation not yet accounted for in the model. This may be due to policy changes within a fiscal year or a longer trend covering several years. Second, the known data (how many officers have submitted applications for attrition) is in aggregate form. That is, all officers are grouped together regardless of rank. It has been proven that officers of different grades and time in service react differently to changes in the economy. Third and perhaps more significant, is that one of the independent variables used to predict officer losses is the number of officers that have already made the decision to leave the Air Force. Presumably, the only effect of unemployment is on the independent variable. There is no separate effect on the dependent variable. Therefore, the unemployment rate at the time of the decision to leave should not be expected to add explanatory power to the model. Unemployment rates may, however, significantly add to the ability to predict the decision to leave the Air Force, submit an application to leave/separate.

B. RECOMMENDATION

Perhaps a better way to predict the number of officer losses is to model the behavior that causes an officer to submit his/her application for retirement/separation. In this manner the regression equation would model causal relationships between economic indicators and behavior related to the attrition decision.

APPENDIX A

HISTORICAL ATTRITION DATA

FILE: NRLRET6 DATA

```
131 63 7 33
101 47 5 34
102 47 9 35
148 67 11 36
206 104 10 37
213 106 12 38
180 79 38 39
342 179 31 40
195 98 21 41
165 84 14 42
170 78 7 43
108 41 9 44
147 62 10 45
126 52 9 46
111 39 16 47
162 79 5 48
281 119 16 49
292 95 16 50
196 88 18 51
344 183 16 52
198 84 17  53
129 63 13 54
145 58 17 55
   149.0000        53.00000        20.00000           56
   121.0000        44.00000        6.000000           57
   154.0000        44.00000        6.000000           58
   126.0000        44.00000        2.000000           59
   186.0000        49.00000        4.000000           60
   310.0000        114.0000        5.000000           61
   421.0000        144.0000        20.00000           62
   293.0000        131.0000        13.00000           63
   319.0000        160.0000        9.000000           64
   138.0000        63.00000        4.000000           65
   91.00000        38.00000        15.00000           66
   125.0000        57.00000        7.000000           67
   164.0000        69.00000        12.00000           68
   118.0000        30.00000        13.00000           69
   128.0000        31.00000        25.00000           70
   112.0000        40.00000        15.00000           71
   134.0000        42.00000        11.00000           72
   265.0000        88.00000        31.00000           73
   290.0000        98.00000        26.00000           74
   254.0000        116.0000        24.00000           75
   224.0000        91.00000        34.00000           76
   121.0000        53.00000        2.000000           77
   112.0000        37.00000        14.00000           78
   106.0000        41.00000        3.000000           79
   114.0000        37.00000        17.00000           80
   114.0000        37.00000        13.00000           81
   112.0000        45.00000        15.00000           82
   123.0000        43.00000        24.00000           83
```

FILE: NRLRET7 DATA

```
142 45 52 31
131 48 2 32
101 40 5 33
102 36 18 34
148 53 10 35
206 79 11 36
213 86 17 37
342 154 31 39
195 81 21 40
165 69 12 41
170 70 7 42
108 32 10 43
147 55 11 44
126 43 9 45
111 36 17 46
162 67 5 47
281 90 15 48
292 71 16 49
196 66 18 50
344 150 18 51
198 67 18 52
129 53 14 53
145 47 17 54
   149.0000       43.00000       22.00000                55
   121.0000       33.00000       6.000000                56
   154.0000       35.00000       17.00000                57
   126.0000       31.00000       2.000000                58
   186.0000       36.00000       3.000000                59
   310.0000       89.00000       5.000000                60
   421.0000       80.00000       5.000000                61
   293.0000       98.00000       6.000000                62
   319.0000       126.0000       7.000000                63
   138.0000       55.00000       3.000000                64
   91.00000       32.00000       15.00000                65
   125.0000       42.00000       6.000000                66
   164.0000       44.00000       4.000000                67
   118.0000       24.00000       5.000000                68
   128.0000       20.00000       5.000000                69
   112.0000       31.00000       2.000000                70
   134.0000       31.00000       1.000000                71
   265.0000       67.00000       11.00000                72
   290.0000       64.00000       8.000000                73
   254.0000       87.00000       11.00000                74
   224.0000       74.00000       14.00000                75
   121.0000       44.00000       3.000000                76
   112.0000       31.00000       8.000000                77
   106.0000       33.00000       3.000000                78
   114.0000       32.00000       17.00000                79
   114.0000       31.00000       9.000000                80
   112.0000       37.00000       8.000000                81
   123.0000       38.00000       13.00000                82
```

```
FILE: NRLRET8  DATA


138 30 16 29
131 41 3 31
101 26 6 32
102 29 19 33
148 51 13 34
206 65 12 35
213 66 20 36
342 125 29 38
195 69 22 39
165 61 13 40
170 62 8 41
108 27 10 42
147 44 12 43
126 35 9 44
111 28 17 45
162 56 5 46
281 77 15 47
292 56 16 48
196 49 18 49
344 124 19 50
198 57 18 51
129 49 14 52
145 47 18 53
   149.0000       36.00000       11.00000                 54
   121.0000       27.00000       6.000000                 55
   154.0000       28.00000       17.00000                 56
   126.0000       26.00000       8.000000                 57
   186.0000       31.00000       2.000000                 58
   310.0000       63.00000       5.000000                 59
   421.0000       60.00000       5.000000                 60
   293.0000       61.00000       6.000000                 61
   319.0000       103.0000       3.000000                 62
   138.0000       42.00000       3.000000                 63
   91.00000       27.00000       11.00000                 64
   125.0000       40.00000       5.000000                 65
   164.0000       33.00000       3.000000                 66
   118.0000       17.00000       4.000000                 67
   128.0000       15.00000       4.000000                 68
   112.0000       26.00000       2.000000                 69
   134.0000       20.00000       1.000000                 70
   265.0000       60.00000       11.00000                 71
   290.0000       53.00000       8.000000                 72
   254.0000       71.00000       7.000000                 73
   224.0000       57.00000       13.00000                 74
   121.0000       35.00000       3.000000                 75
   112.0000       24.00000       7.000000                 76
   106.0000       33.00000      0.0000000E+00             77
   114.0000       28.00000       7.000000                 78
   114.0000       26.00000       6.000000                 79
   112.0000       34.00000       7.000000                 80
   123.0000       31.00000       11.00000                 81
```

```
FILE: NRLRET9  DATA

138 23 16 28
131 36 3 30
101 22 9 31
102 27 17 32
148 41 13 33
206 62 20 34
213 55 20 35
342 98 30 37
195 53 20 38
165 61 13 39
170 61 8 40
108 23 10 41
147 40 13 42
126 31 9 43
111 28 17 44
162 44 5 45
281 66 15 46
292 50 17 47
196 44 18 48
344 103 19 49
198 47 20 50
129 43 14 51
145 38 19 52
   149.0000       30.00000       11.00000                53
   121.0000       25.00000       8.000000                54
   154.0000       25.00000       17.00000                55
   126.0000       22.00000       8.000000                56
   186.0000       25.00000       24.00000                57
   310.0000       52.00000       5.000000                58
   421.0000       49.00000       4.000000                59
   293.0000       46.00000       5.000000                60
   319.0000       75.00000       1.000000                61
   138.0000       33.00000       3.000000                62
   91.00000       22.00000       9.000000                63
   125.0000       38.00000       4.000000                64
   164.0000       28.00000       3.000000                65
   118.0000       14.00000       4.000000                66
   128.0000       9.000000       3.000000                67
   112.0000       22.00000       1.000000                68
   134.0000       14.00000       1.000000                69
   265.0000       42.00000       9.000000                70
   290.0000       41.00000       6.000000                71
   254.0000       52.00000       7.000000                72
   224.0000       48.00000       9.000000                73
   121.0000       25.00000       2.000000                74
   112.0000       23.00000       4.000000                75
   106.0000       29.00000      0.0000000E+00            76
   114.0000       27.00000       7.000000                77
   114.0000       23.00000       4.000000                78
   112.0000       32.00000       7.000000                79
   123.0000       28.00000       10.00000                80
```

FILE: NRLRET10 DATA

```
138 18 17 27
131 32 4 29
101 17 9 30
102 21 18 31
148 37 14 32
206 50 20 33
213 51 32 34
342 70 31 36
195 46 20 37
165 58 12 38
170 54 8 39
108 19 10 40
147 35 14 41
126 28 11 42
111 25 17 43
162 40 5 44
281 53 16 45
292 42 18 46
196 35 19 47
344 80 20 48
198 42 22 49
129 34 15 50
145 31 21 51
   149.0000       27.00000      12.00000              52
   121.0000       24.00000      8.000000              53
   154.0000       23.00000      16.00000              54
   126.0000       19.00000      9.000000              55
   186.0000       23.00000      25.00000              56
   310.0000       38.00000      20.00000              57
   421.0000       39.00000      5.000000              58
   293.0000       40.00000      5.000000              59
   319.0000       63.00000      1.000000              60
   138.0000       26.00000      3.000000              61
   91.00000       21.00000      3.000000              62
   125.0000       28.00000      4.000000              63
   164.0000       26.00000      3.000000              64
   118.0000       11.00000      4.000000              65
   128.0000       8.000000      3.000000              66
   112.0000       20.00000      1.000000              67
   134.0000       14.00000      1.000000              68
   265.0000       38.00000      9.000000              69
   290.0000       37.00000      6.000000              70
   254.0000       40.00000      4.000000              71
   224.0000       35.00000      6.000000              72
   121.0000       20.00000      1.000000              73
   112.0000       18.00000      3.000000              74
   106.0000       25.00000     0.0000000E+00          75
   114.0000       19.00000      6.000000              76
   114.0000       17.00000      3.000000              77
   112.0000       27.00000      4.000000              78
   123.0000       26.00000      7.000000              79
```

FILE: NRLRET11 DATA

```
138 17 17 26
131 22 4 28
101 17 9 29
102 20 18 30
148 32 14 31
206 39 16 32
213 36 34 33
342 57 32 35
195 31 22 36
165 44 12 37
170 44 7 38
108 18 10 39
147 32 15 40
126 25 11 41
111 20 17 42
162 29 5 43
281 39 17 44
292 32 20 45
196 27 19 46
344 70 21 47
198 35 22 48
129 26 15 49
145 34 15 50
   149.0000        23.00000        13.00000                 51
   121.0000        23.00000        10.00000                 52
   154.0000        20.00000        15.00000                 53
   126.0000        14.00000        9.000000                 54
   186.0000        21.00000        25.00000                 55
   310.0000        32.00000        20.00000                 56
   421.0000        26.00000        39.00000                 57
   293.0000        32.00000        2.000000                 58
   319.0000        48.00000        1.000000                 59
   138.0000        21.00000        1.000000                 60
   91.00000        15.00000        2.000000                 61
   125.0000        28.00000       0.0000000E+00             62
   164.0000        25.00000       0.0000000E+00             63
   118.0000        9.000000        3.000000                 64
   128.0000        8.000000       0.0000000E+00             65
   112.0000        17.00000       0.0000000E+00             66
   134.0000        13.00000       0.0000000E+00             67
   265.0000        30.00000        3.000000                 68
   290.0000        29.00000        4.000000                 69
   254.0000        30.00000        1.000000                 70
   224.0000        27.00000        2.000000                 71
   121.0000        15.00000        1.000000                 72
   112.0000        14.00000        1.000000                 73
   106.0000        21.00000       0.0000000E+00             74
   114.0000        13.00000        5.000000                 75
   114.0000        15.00000       0.0000000E+00             76
   112.0000        24.00000        2.000000                 77
   123.0000        22.00000        4.000000                 78
```

FILE: NRLRET12 DATA

```
138 14 17 25
131 16 4 27
101 14 10 28
102 15 18 29
148 22 14 30
206 29 16 31
213 24 37 32
342 38 38 34
195 15 24 35
165 23 11 36
170 29 8 37
108 13 10 38
147 26 19 39
126 20 12 40
111 13 17 41
162 23 5 42
281 30 16 43
292 19 21 44
196 13 18 45
344 49 23 46
198 30 22 47
129 18 15 48
145 19 24 49
   149.0000       26.00000       24.00000                50
   121.0000       18.00000       10.00000                51
   154.0000       17.00000       15.00000                52
   126.0000       10.00000       9.000000                53
   186.0000       14.00000       25.00000                54
   310.0000       19.00000       20.00000                55
   421.0000       20.00000       40.00000                56
   293.0000       17.00000       31.00000                57
   319.0000       29.00000      0.0000000E+00            58
   138.0000       18.00000       1.000000                59
   91.00000       14.00000      0.0000000E+00            60
   125.0000       16.00000      0.0000000E+00            61
   164.0000       19.00000      0.0000000E+00            62
   118.0000       7.000000       2.000000                63
   128.0000       7.000000      0.0000000E+00            64
   112.0000       12.00000      0.0000000E+00            65
   134.0000       9.000000      0.0000000E+00            66
   265.0000       16.00000       2.000000                67
   290.0000       17.00000       1.000000                68
   254.0000       21.00000       1.000000                69
   224.0000       17.00000       1.000000                70
   121.0000       13.00000       1.000000                71
   112.0000       10.00000       1.000000                72
   106.0000       17.00000      0.0000000E+00            73
   114.0000       8.000000      0.0000000E+00            74
   114.0000       10.00000      0.0000000E+00            75
   112.0000       21.00000       2.000000                76
   123.0000       15.00000       3.000000                77
```

```
FILE: NRLSEP6  DATA

37 39 17
39 113 9
35 118 11
74 184 26
78 109 25
85 207 20
63 168 23
78 291 16
49 181 11
38 117 6
64 184 8
35 191 9
38 144 10
33 132 13
57 253 12
82 254 16
84 262 17
108 432 14
117 518 21
30 88 13
49 186 34
59 82 33
57 180 15
   42.00000     206.0000     15.00000
   47.00000     176.0000     11.00000
   52.00000     141.0000     15.00000
   70.00000     96.00000     27.00000
   75.00000     72.00000     40.00000
   108.0000     226.0000     18.00000
   110.0000     157.0000     24.00000
   77.00000     111.0000     8.000000
   118.0000     265.0000     31.00000
   74.00000     103.0000     23.00000
   63.00000     47.00000     31.00000
   67.00000     68.00000     31.00000
   64.00000     106.0000     21.00000
   40.00000     64.00000     17.00000
   49.00000     55.00000     12.00000
   68.00000     64.00000     37.00000
   69.00000     66.00000     25.00000
   86.00000     63.00000     30.00000
   101.0000     63.00000     36.00000
   87.00000     52.00000     27.00000
   100.0000     159.0000     38.00000
   65.00000     68.00000     45.00000
   74.00000     60.00000     42.00000
   69.00000     69.00000     42.00000
   58.00000     64.00000     32.00000
   50.00000     36.00000     29.00000
   50.00000     41.00000     22.00000
   58.00000     33.00000     24.00000
```

```
FILE: NRLSEP7  DATA

37 45 4
39 125 5
35 135 5
74 200 15
78 125 15
85 221 12
63 192 10
78 309 9
49 216 6
38 159 2
64 208 3
35 204 2
38 160 5
33 142 4
57 276 5
82 297 7
84 281 8
108 496 5
117 584 13
30 114 9
49 293 12
59 162 25
57 204 11
 42.00000     215.0000     15.00000
 47.00000     202.0000     11.00000
 52.00000     281.0000     7.000000
 70.00000     138.0000     16.00000
 75.00000     102.0000     27.00000
 108.0000     236.0000     14.00000
 110.0000     176.0000     12.00000
 77.00000     128.0000     7.000000
 118.0000     349.0000     14.00000
 74.00000     139.0000     6.000000
 63.00000     91.00000     13.00000
 67.00000     78.00000     23.00000
 64.00000     108.0000     15.00000
 40.00000     68.00000     10.00000
 49.00000     63.00000     10.00000
 68.00000     69.00000     24.00000
 69.00000     85.00000     10.00000
 86.00000     69.00000     20.00000
 101.0000     67.00000     21.00000
 87.00000     57.00000     18.00000
 100.0000     224.0000     11.00000
 65.00000     98.00000     28.00000
 74.00000     65.00000     36.00000
 69.00000     85.00000     24.00000
 58.00000     82.00000     21.00000
 50.00000     46.00000     26.00000
 50.00000     50.00000     22.00000
 58.00000     37.00000     18.00000
```

```
FILE: NRLSEP8  DATA                         FILE: NRLSEP9  DATA


37 52 2                                     37 64 1
39 138 5                                    39 142 5
35 147 3                                    35 151 2
74 231 13                                   74 253 10
78 129 10                                   78 138 8
85 237 8                                    85 250 3
63 221 3                                    63 233 3
78 329 7                                    78 346 4
49 227 2                                    49 252 0
38 185 2                                    38 201 2
64 233 1                                    64 257 0
35 224 2                                    35 258 2
38 172 2                                    38 186 2
33 147 4                                    33 154 3
57 286 4                                    57 303 3
82 325 6                                    82 337 5
84 307 6                                    84 325 5
108 534 4                                   108 567 4
117 644 6                                   117 678 5
30 134 8                                    30 157 4
49 374 9                                    49 424 4
59 231 8                                    59 284 6
57 241 7                                    57 275 4
   42.00000      222.0000      16.00000     42.00000      253.0000      7.000000
   47.00000      208.0000      13.00000     47.00000      225.0000      14.00000
   52.00000      310.0000      9.000000     52.00000      330.0000      11.00000
   70.00000      222.0000      8.000000     70.00000      245.0000      9.000000
   75.00000      161.0000      20.00000     75.00000      262.0000      11.00000
   108.0000      261.0000      13.00000     108.0000      290.0000      14.00000
   110.0000      182.0000      7.000000     110.0000      212.0000      6.000000
   77.00000      135.0000      3.000000     77.00000      161.0000      3.000000
   118.0000      378.0000      14.00000     118.0000      398.0000      7.000000
   74.00000      171.0000      4.000000     74.00000      182.0000      4.000000
   63.00000      120.0000      12.00000     63.00000      139.0000      6.000000
   67.00000      104.0000      14.00000     67.00000      129.0000      13.00000
   64.00000      118.0000      12.00000     64.00000      132.0000      11.00000
   40.00000      71.00000      10.00000     40.00000      82.00000      7.000000
   49.00000      68.00000      7.000000     49.00000      71.00000      7.000000
   68.00000      87.00000      16.00000     68.00000      98.00000      12.00000
   69.00000      109.0000      11.00000     69.00000      121.0000      11.00000
   86.00000      80.00000      20.00000     86.00000      82.00000      13.00000
   101.0000      70.00000      12.00000     101.0000      84.00000      10.00000
   87.00000      61.00000      11.00000     87.00000      66.00000      8.000000
   100.0000      248.0000      7.000000     100.0000      257.0000      5.000000
   65.00000      135.0000      9.000000     65.00000      147.0000      7.000000
   74.00000      95.00000      25.00000     74.00000      118.0000      12.00000
   69.00000      96.00000      21.00000     69.00000      120.0000      10.00000
   58.00000      88.00000      10.00000     58.00000      96.00000      13.00000
   50.00000      61.00000      20.00000     50.00000      70.00000      12.00000
   50.00000      61.00000      17.00000     50.00000      79.00000      17.00000
   58.00000      50.00000      20.00000     58.00000      55.00000      19.00000
```

```
FILE: NRLSEP10 DATA                                   FILE: NRLSEP11 DATA


37 74 1                                               37 78 1
39 155 2                                              39 173 1
35 162 1                                              35 181 1
74 268 8                                              74 282 8
78 144 5                                              78 149 5
85 258 2                                              85 272 1
63 245 1                                              63 260 1
78 381 4                                              78 404 3
49 273 0                                              49 287 0
38 216 0                                              38 242 0
64 276 0                                              64 294 0
35 281 1                                              35 304 1
38 210 2                                              38 229 2
33 172 3                                              33 187 3
57 317 3                                              57 342 2
82 356 5                                              82 390 5
84 346 5                                              84 373 1
108 595 4                                             108 624 2
117 712 2                                             117 746 1
30 171 3                                              30 181 2
49 459 0                                              49 487 0
59 314 8                                              59 346 1
57 301 4                                              57 336 2
   42.00000        285.0000        7.000000     42.00000        320.0000        6.000000
   47.00000        249.0000        7.000000     47.00000        275.0000        5.000000
   52.00000        351.0000        11.00000     52.00000        394.0000        7.000000
   70.00000        260.0000        14.00000     70.00000        280.0000        16.00000
   75.00000        297.0000        10.00000     75.00000        305.0000        9.000000
   108.0000        43.00000        11.00000     108.0000        461.0000        11.00000
   110.0000        245.0000        5.000000     110.0000        377.0000        4.000000
   77.00000        189.0000        1.000000     77.00000        203.0000       0.0000000E+00
   118.0000        414.0000        7.000000     118.0000        451.0000        4.000000
   74.00000        192.0000        6.000000     74.00000        202.0000        5.000000
   63.00000        154.0000        6.000000     63.00000        164.0000        4.000000
   67.00000        141.0000        10.00000     67.00000        163.0000        8.000000
   64.00000        156.0000        10.00000     64.00000        174.0000        6.000000
   40.00000        102.0000        4.000000     40.00000        116.0000        4.000000
   49.00000        80.00000        5.000000     49.00000        98.00000        4.000000
   68.00000        108.0000        12.00000     68.00000        130.0000        10.00000
   69.00000        125.0000        8.000000     69.00000        133.0000        8.000000
   86.00000        103.0000        11.00000     86.00000        108.0000        9.000000
   101.0000        89.00000        7.000000     101.0000        105.0000        6.000000
   87.00000        69.00000        6.000000     87.00000        74.00000        6.000000
   100.0000        275.0000        5.000000     100.0000        296.0000        5.000000
   65.00000        151.0000        4.000000     65.00000        162.0000        4.000000
   74.00000        127.0000        7.000000     74.00000        135.0000        5.000000
   69.00000        148.0000        7.000000     69.00000        154.0000        5.000000
   58.00000        108.0000        12.00000     58.00000        128.0000        5.000000
   50.00000        72.00000        12.00000     50.00000        94.00000        12.00000
   50.00000        91.00000        8.000000     50.00000        97.00000        7.000000
   58.00000        67.00000        19.00000     58.00000        77.00000        9.000000
```

FILE: NRLSEP12 DATA

```
37 89 1
39 186 1
35 198 0
74 300 5
78 161 4
85 287 1
63 266 1
78 416 2
49 306 0
38 266 0
64 319 0
35 320 1
38 245 1
33 200 0
57 380 2
82 421 4
84 398 1
108 665 2
117 785 1
30 193 1
49 511 0
59 379 1
57 361 0
     42.00000        360.0000        8.000000
     47.00000        307.0000        4.000000
     52.00000        431.0000        2.000000
     70.00000        338.0000        10.00000
     75.00000        329.0000        11.00000
     108.0000        493.0000        13.00000
     110.0000        418.0000        4.000000
     77.00000        333.0000        1.000000
     118.0000        480.0000        3.000000
     74.00000        233.0000        3.000000
     63.00000        174.0000        3.000000
     67.00000        169.0000        2.000000
     64.00000        194.0000        5.000000
     40.00000        129.0000        4.000000
     49.00000        114.0000        4.000000
     68.00000        149.0000        6.000000
     69.00000        147.0000        6.000000
     86.00000        110.0000        11.00000
     101.0000        111.0000        5.000000
     87.00000        82.00000        7.000000
     100.0000        310.0000        5.000000
     65.00000        174.0000        1.000000
     74.00000        146.0000        4.000000
     69.00000        157.0000        3.000000
     58.00000        141.0000        4.000000
     50.00000        111.0000        6.000000
     50.00000        110.0000        5.000000
     58.00000        86.00000        6.000000
```

APPENDIX B

HISTORICAL ECONOMIC DATA FILES USED IN ANALYSIS

Help Wanted Advertising
Seasonally Adjusted, the year 1967=100
January 1980 through April 1987
(In thousands)

	80	81	82	83	84	85	86	87
January	154	128	106	83	123	140	143	142
February	151	129	103	83	129	141	142	147
March	145	125	96	83	124	141	138	150
April	122	118	88	81	124	132	132	144
May	112	118	87	87	125	132	128	
June	115	121	85	92	134	141	141	
July	118	123	83	100	138	141	140	
August	117	119	78	97	128	134	134	
September	122	112	73	98	129	136	135	
October	127	110	76	111	135	140	141	
November	134	111	78	114	137	144	147	
December	130	109	83	121	145	145	145	

Source: U.S. Department of Commerce, Bureau of Economic Analysis, "Survey of Current Business".

Total Civilian Unemployment Rates
16 years and older, Seasonally adjusted
January 1980 through April 1987

	80	81	82	83	84	85	86	87
January	6.2	7.4	8.6	10.4	8.0	7.4	6.8	6.7
February	6.2	7.3	8.8	10.4	7.8	7.3	7.2	6.7
March	6.3	7.3	9.0	10.3	7.8	7.3	7.2	6.6
April	6.9	7.3	9.3	10.2	7.8	7.3	7.1	6.3
May	7.6	7.6	9.4	10.1	7.5	7.3	7.2	
June	7.5	7.3	9.5	10.0	7.2	7.3	7.1	
July	7.6	7.0	9.8	9.5	7.5	7.3	7.0	
August	7.6	7.2	9.9	9.5	7.5	7.1	6.8	
September	7.4	7.5	10.2	9.2	7.4	7.1	7.0	
October	7.6	8.0	10.5	8.8	7.3	7.1	6.9	
November	7.5	8.4	10.7	8.4	7.1	7.0	6.9	
December	7.4	8.9	10.8	8.2	7.2	6.9	6.7	

Source: U.S. Department of Labor, Bureau of Labor Standards, "Employment and Earnings".

Changes in Unemployment Rates
January 1980 through April 1987
(Changes are from prior month)

	80	81	82	83	84	85	86	87
January	.3	0	-.3	-.4	-.2	.2	-.1	0
February	0	-.1	.2	0	-.2	-.1	.4	0
March	.1	0	.2	-.1	0	0	0	-.1
April	.6	0	.3	-.1	0	0	-.1	-.3
May	.7	.3	.1	-.1	-.3	0	.1	
June	-.1	-.3	.1	-.1	-.3	0	-.1	
July	.1	-.3	.3	-.5	.3	0	-.1	
August	0	.2	.1	0	0	-.2	-.2	
September	-.2	.3	.3	-.3	-.1	0	.2	
October	.2	.5	.3	-.4	-.1	0	-.1	
November	-.1	.4	.2	-.4	-.2	-.1	0	
December	-.1	.5	.1	-.2	.1	-.1	-.2	

Source: U.S. Department of Labor, Bureau of Labor Statistics, "Employment and Earnings". Simple subtraction of one month's statistic from the preceding month's statistic. Derived from the previously listed unemployment rate chart.

Index of Leading Economic Indicators
(Composite of 12 Leading Indicators)
Seasonally Adjusted
January 1980 through April 1987

	80	81	82	83	84	85	86	87
January	134.7	142.1	135.1	145.2	164.5	165.5	174.1	183.8
February	134.1	140.4	135.7	147.4	166.5	166.5	175.0	187.1
March	131.5	141.7	134.7	150.2	167.2	167.2	176.4	187.5
April	126.2	144.6	136.0	152.5	168.1	165.9	178.1	186.6
May	123.0	144.5	136.2	154.4	168.2	166.9	178.5	
June	123.9	143.2	135.5	157.3	166.7	167.3	178.3	
July	128.1	142.9	136.2	158.2	163.9	168.5	179.7	
August	130.7	142.4	136.1	158.9	164.4	169.3	180.1	
September	134.4	139.3	137.5	160.0	165.7	170.2	179.9	
October	135.0	136.9	138.6	162.4	164.2	171.2	181.2	
November	136.5	137.0	139.4	162.5	165.1	171.1	182.7	
December	136.4	136.2	140.9	163.4	164.1	174.0	186.6	

Source: U.S. Department of Commerce, Bureau of Economic Analysis, "Business Conditions Digest".

Changes in the Leading Economic Indicators Index
January 1980 through April 1987
(Changes are from the previous month)

	80	81	82	83	84	85	86	87
January	-.5	5.7	-1.1	4.3	.9	1.4	.1	-2.8
February	-.6	-1.7	.6	1.8	2.0	1.0	.9	3.3
March	-2.6	.7	-1.0	2.8	.7	.7	1.4	.4
April	-5.3	2.9	1.3	2.3	.9	-1.3	1.7	-.9
May	-3.2	-.1	.2	1.9	.1	1.0	.4	
June	.9	-.7	-.7	2.9	-1.5	.4	-.2	
July	4.2	-.3	.7	.9	-2.8	.8	1.4	
August	2.6	-.5	-.1	.7	.5	.8	.4	
September	3.7	-3.1	1.4	1.1	1.3	.9	-.2	
October	.6	-2.4	1.1	2.4	-.5	1.0	1.3	
November	.5	.1	.8	.1	.9	-.1	1.5	
December	-.1	-.8	1.5	.9	-1.0	2.9	3.9	

Source: U.S. Department of Commerce, Bureau of Economic Analysis, "Business Conditions Digest". Calculated by taking the difference between two consecutive months.

APPENDIX C

ATTRITION AND ECONOMIC DATA
AS SEQUENCED IN REGRESSION ANALYSIS

FILE: NRLRET6L DATA

ACC	VOL	MAND	SEQ	UNCHG	IND	UN	HW	INDCHG
186.0000	49.00000	4.000000	60	-.4	162.5	8.4	114	.1
310.0000	114.0000	5.000000	61	-.2	163.4	8.2	121	.9
421.0000	144.0000	20.00000	62	-.2	164.5	8.0	123	.9
293.0000	131.0000	13.00000	63	-.2	166.5	7.8	129	2.0
319.0000	160.0000	9.000000	64	0	167.2	7.8	124	.7
138.0000	63.00000	4.000000	65	0	168.1	7.8	124	.9
91.00000	38.00000	15.00000	66	-.3	168.2	7.5	125	.1
125.0000	57.00000	7.000000	67	-.3	166.9	7.2	134	-1.5
164.0000	69.00000	12.00000	68	.3	163.9	7.5	138	-2.8
118.0000	30.00000	13.00000	69	0	164.5	7.5	128	.5
128.0000	31.00000	25.00000	70	-.1	165.9	7.4	129	1.3
112.0000	40.00000	15.00000	71	-.1	164.2	7.3	135	-.5
134.0000	42.00000	11.00000	72	-.2	165.3	7.1	137	.9
265.0000	88.00000	31.00000	73	.1	164.3	7.2	145	-1
290.0000	98.00000	26.00000	74	.2	165.5	7.4	140	1.4
254.0000	116.0000	24.00000	75	-.1	166.5	7.3	141	1
224.0000	91.00000	34.00000	76	0	167.2	7.3	141	.7
121.0000	53.00000	2.000000	77	0	165.9	7.3	132	-1.3
112.0000	37.00000	14.00000	78	0	166.9	7.3	132	1
106.0000	41.00000	3.000000	79	0	167.3	7.3	141	.4
114.0000	37.00000	17.00000	80	0	168.5	7.3	141	.8
114.0000	37.00000	13.00000	81	-.2	169.3	7.1	134	.8
112.0000	45.00000	15.00000	82	0	170.2	7.1	136	.9
123.0000	43.00000	24.00000	83	0	171.2	7.1	140	1

FILE: NRLRET7L DATA

ACC	VOL	MAND	SEQ	UNCHG	IND	UN	HW	INDCHG
186.0000	36.00000	3.000000	59	-.4	162.5	8.4	114	.1
310.0000	89.00000	5.000000	60	-.2	163.4	8.2	121	.9
421.0000	80.00000	5.000000	61	-.2	164.5	8.0	123	.9
293.0000	98.00000	6.000000	62	-.2	166.5	7.8	129	2.0
319.0000	126.0000	7.000000	63	0	167.2	7.8	124	.7
138.0000	55.00000	3.000000	64	0	168.1	7.8	124	.9
91.00000	32.00000	15.00000	65	-.3	168.2	7.5	125	.1
125.0000	42.00000	6.000000	66	-.3	166.9	7.2	134	-1.5
164.0000	44.00000	4.000000	67	.3	163.9	7.5	138	-2.8
118.0000	24.00000	5.000000	68	0	164.5	7.5	128	.5
128.0000	20.00000	5.000000	69	-.1	165.9	7.4	129	1.3
112.0000	31.00000	2.000000	70	-.1	164.2	7.3	135	-.5
134.0000	31.00000	1.000000	71	-.2	165.3	7.1	137	.9
265.0000	67.00000	11.00000	72	.1	164.3	7.2	145	-1
290.0000	64.00000	8.000000	73	.2	165.5	7.4	140	1.4
254.0000	87.00000	11.00000	74	-.1	166.5	7.3	141	1
224.0000	74.00000	14.00000	75	0	167.2	7.3	141	.7
121.0000	44.00000	3.000000	76	0	165.9	7.3	132	-1.3
112.0000	31.00000	8.000000	77	0	166.9	7.3	132	1
106.0000	33.00000	3.000000	78	0	167.3	7.3	141	.4
114.0000	32.00000	17.00000	79	0	168.5	7.3	141	.8
114.0000	31.00000	9.000000	80	-.2	169.3	7.1	134	.8
112.0000	37.00000	8.000000	81	0	170.2	7.1	136	.9
123.0000	38.00000	13.00000	82	0	171.2	7.1	140	1

FILE: NRLRET8L DATA

```
   ACC            VOL            MAND                   SEQ  UNCHG       IND        UN       HW    INDCHG

 186.0000      31.00000      2.000000                58   -.4        162.4      8.8      111     2.4
 310.0000      63.00000      5.000000                59   -.4        162.5      8.4      114     .1
 421.0000      60.00000      5.000000                60   -.2        163.4      8.2      121     .9
 293.0000      61.00000      6.000000                61   -.2        164.5      8.0      123     .9
 319.0000      103.0000      3.000000                62   -.2        166.5      7.8      129     2.0
 138.0000      42.00000      3.000000                63   0          167.2      7.8      124     .7
 91.00000      27.00000      11.00000                64   0          168.1      7.8      124     .9
 125.0000      40.00000      5.000000                65   -.3        168.2      7.5      125     .1
 164.0000      33.00000      3.000000                66   -.3        166.9      7.2      134     -1.5
 118.0000      17.00000      4.000000                67   .3         163.9      7.5      138     -2.8
 128.0000      15.00000      4.000000                68   0          164.5      7.5      128     .5
 112.0000      26.00000      2.000000                69   -.1        165.9      7.4      129     1.3
 134.0000      20.00000      1.000000                70   -.1        164.2      7.3      135     -.5
 265.0000      60.00000      11.00000                71   -.2        165.3      7.1      137     .9
 290.0000      53.00000      8.000000                72   .1         164.3      7.2      145     -1
 254.0000      71.00000      7.000000                73   .2         165.5      7.4      140     1.4
 224.0000      57.00000      13.00000                74   -.1        166.5      7.3      141     1
 121.0000      35.00000      3.000000                75   0          167.2      7.3      141     .7
 112.0000      24.00000      7.000000                76   0          165.9      7.3      132     -1.3
 106.0000      33.00000     0.0000000E+00            77   0          166.9      7.3      132     1
 114.0000      28.00000      7.000000                78   0          167.3      7.3      141     .4
 114.0000      26.00000      6.000000                79   0          168.5      7.3      141     .8
 112.0000      34.00000      7.000000                80   -.2        169.3      7.1      134     .8
 123.0000      31.00000      11.00000                81   0          170.2      7.1      136     .9
```

FILE: NRLRET9L DATA

ACC	VOL	MAND	SEQ	UNCHG	IND	UN	HW	INDCHG
186.0000	25.00000	24.00000	57	0	158.9	9.5	97	.7
310.0000	52.00000	5.000000	58	-.3	160.0	9.2	98	1.1
421.0000	49.00000	4.000000	59	-.4	162.4	8.8	111	2.4
293.0000	46.00000	5.000000	60	-.4	162.5	8.4	114	.1
319.0000	75.00000	1.000000	61	-.2	163.4	8.2	121	.9
138.0000	33.00000	3.000000	62	-.2	164.5	8.0	123	.9
91.00000	22.00000	9.000000	63	-.2	166.5	7.8	129	2.0
125.0000	38.00000	4.000000	64	0	167.2	7.8	124	.7
164.0000	28.00000	3.000000	65	0	168.1	7.8	124	.9
118.0000	14.00000	4.000000	66	-.3	168.2	7.5	125	.1
128.0000	9.000000	3.000000	67	-.3	166.9	7.2	134	-1.5
112.0000	22.00000	1.000000	68	.3	163.9	7.5	138	-2.8
134.0000	14.00000	1.000000	69	0	164.5	7.5	128	.5
265.0000	42.00000	9.000000	70	-.1	165.9	7.4	129	1.3
290.0000	41.00000	6.000000	71	-.1	164.2	7.3	135	-.5
254.0000	52.00000	7.000000	72	-.2	165.3	7.1	137	.9
224.0000	48.00000	9.000000	73	.1	164.3	7.2	145	-1
121.0000	25.00000	2.000000	74	.2	165.5	7.4	140	1.4
112.0000	23.00000	4.000000	75	-.1	166.5	7.3	141	1
106.0000	29.00000	0.0000000E+00	76	0	167.2	7.3	141	.7
114.0000	27.00000	7.000000	77	0	165.9	7.3	132	-1.3
114.0000	23.00000	4.000000	78	0	166.9	7.3	132	1
112.0000	32.00000	7.000000	79	0	167.3	7.3	141	.4
123.0000	28.00000	10.00000	80	0	168.5	7.3	141	.8

FILE: NRRET10L DATA

ACC	VOL	MAND	SEQ	UNCHG	IND	UN	HW	INDCHG
186.0000	23.00000	25.00000	56	0	158.9	9.5	97	.7
310.0000	38.00000	20.00000	57	-.3	160.0	9.2	98	1.1
421.0000	39.00000	5.000000	58	-.4	162.4	8.8	111	2.4
293.0000	40.00000	5.000000	59	-.4	162.5	8.4	114	.1
319.0000	63.00000	1.000000	60	-.2	163.4	8.2	121	.9
138.0000	26.00000	3.000000	61	-.2	164.5	8.0	123	.9
91.00000	21.00000	3.000000	62	-.2	166.5	7.8	129	2.0
125.0000	28.00000	4.000000	63	0	167.2	7.8	124	.7
164.0000	26.00000	3.000000	64	0	168.1	7.8	124	.9
118.0000	11.00000	4.000000	65	-.3	168.2	7.5	125	.1
128.0000	8.000000	3.000000	66	-.3	166.9	7.2	134	-1.5
112.0000	20.00000	1.000000	67	.3	163.9	7.5	138	-2.8
134.0000	14.00000	1.000000	68	0	164.5	7.5	128	.5
265.0000	38.00000	9.000000	69	-.1	165.9	7.4	129	1.3
290.0000	37.00000	6.000000	70	-.1	164.2	7.3	135	-.5
254.0000	40.00000	4.000000	71	-.2	165.3	7.1	137	.9
224.0000	35.00000	6.000000	72	.1	164.3	7.2	145	-1
121.0000	20.00000	1.000000	73	.2	165.5	7.4	140	1.4
112.0000	18.00000	3.000000	74	-.1	166.5	7.3	141	1
106.0000	25.00000	0.0000000E+00	75	0	167.2	7.3	141	.7
114.0000	19.00000	6.000000	76	0	165.9	7.3	132	-1.3
114.0000	17.00000	3.000000	77	0	166.9	7.3	132	1
112.0000	27.00000	4.000000	78	0	167.3	7.3	141	.4
123.0000	26.00000	7.000000	79	0	168.5	7.3	141	.8

FILE: NRRET11L DATA

ACC	VOL	MAND	SEQ	UNCHG	IND	UN	HW	INDCHG
186.0000	21.00000	25.00000	55	-.5	158.2	9.5	100	.9
310.0000	32.00000	20.00000	56	0	158.9	9.5	97	.7
421.0000	26.00000	39.00000	57	-.3	160.0	9.2	98	1.1
293.0000	32.00000	2.000000	58	-.4	162.4	8.8	111	2.4
319.0000	48.00000	1.000000	59	-.4	162.5	8.4	114	.1
138.0000	21.00000	1.000000	60	-.2	163.4	8.2	121	.9
91.00000	15.00000	2.000000	61	-.2	164.5	8.0	123	.9
125.0000	28.00000	0.0000000E+00	62	-.2	166.5	7.8	129	2.0
164.0000	25.00000	0.0000000E+00	63	0	167.2	7.8	124	.7
118.0000	9.000000	3.000000	64	0	168.1	7.8	124	.9
128.0000	8.000000	0.0000000E+00	65	-.3	168.2	7.5	125	.1
112.0000	17.00000	0.0000000E+00	66	-.3	166.9	7.2	134	-1.5
134.0000	13.00000	0.0000000E+00	67	.3	163.9	7.5	138	-2.8
265.0000	30.00000	3.000000	68	0	164.5	7.5	128	.5
290.0000	29.00000	4.000000	69	-.1	165.9	7.4	129	1.3
254.0000	30.00000	1.000000	70	-.1	164.2	7.3	135	-.5
224.0000	27.00000	2.000000	71	-.2	165.3	7.1	137	.9
121.0000	15.00000	1.000000	72	.1	164.3	7.2	145	-1
112.0000	14.00000	1.000000	73	.2	165.5	7.4	140	1.4
106.0000	21.00000	0.0000000E+00	74	-.1	166.5	7.3	141	1
114.0000	13.00000	5.000000	75	0	167.2	7.3	141	.7
114.0000	15.00000	0.0000000E+00	76	0	165.9	7.3	132	-1.3
112.0000	24.00000	2.000000	77	0	166.9	7.3	132	1
123.0000	22.00000	4.000000	78	0	167.3	7.3	141	.4

FILE: NRRET12L DATA

ACC	VOL	MAND	SEQ	UNCHG	IND	UN	HW	INDCHG
186.0000	14.00000	25.00000	54	-.1	154.4	10.1	87	1.9
310.0000	19.00000	20.00000	55	-.1	157.3	10.0	92	2.9
421.0000	20.00000	40.00000	56	-.5	158.2	9.5	100	.9
293.0000	17.00000	31.00000	57	0	158.9	9.5	97	.7
319.0000	29.00000	0.0000000E+00	58	-.3	160.0	9.2	98	1.1
138.0000	18.00000	1.000000	59	-.4	162.4	8.8	111	2.4
91.00000	14.00000	0.0000000E+00	60	-.4	162.5	8.4	114	.1
125.0000	16.00000	0.0000000E+00	61	-.2	163.4	8.2	121	.9
164.0000	19.00000	0.0000000E+00	62	-.2	164.5	8.0	123	.9
118.0000	7.000000	2.000000	63	-.2	166.5	7.8	129	2.0
128.0000	7.000000	0.0000000E+00	64	0	167.2	7.8	124	.7
112.0000	12.00000	0.0000000E+00	65	0	168.1	7.8	124	.9
134.0000	9.000000	0.0000000E+00	66	-.3	168.2	7.5	125	.1
265.0000	16.00000	2.000000	67	-.3	166.9	7.2	134	-1.5
290.0000	17.00000	1.000000	68	.3	163.9	7.5	138	-2.8
254.0000	21.00000	1.000000	69	0	164.5	7.5	128	.5
224.0000	17.00000	1.000000	70	-.1	165.9	7.4	129	1.3
121.0000	13.00000	1.000000	71	-.1	164.2	7.3	135	-.5
112.0000	10.00000	1.000000	72	-.2	165.3	7.1	137	.9
106.0000	17.00000	0.0000000E+00	73	.1	164.3	7.2	145	-1
114.0000	8.000000	0.0000000E+00	74	.2	165.5	7.4	140	1.4
114.0000	10.00000	0.0000000E+00	75	-.1	166.5	7.3	141	.1
112.0000	21.00000	2.000000	76	0	167.2	7.3	141	.7
123.0000	15.00000	3.000000	77	0	165.9	7.3	132	-1.3

FILE: NRLSEP6L DATA

ACC	NSPD	SPD	UNCHG	IND	UN	HW	INDCHG
75.00000	72.00000	40.00000	-.4	162.5	8.4	114	.1
108.0000	226.0000	18.00000	-.2	163.4	8.2	121	.9
110.0000	157.0000	24.00000	-.2	164.5	8.0	123	.9
77.00000	111.0000	8.000000	-.2	166.5	7.8	129	2.0
118.0000	265.0000	31.00000	0	167.2	7.8	124	.7
74.00000	103.0000	23.00000	0	168.1	7.8	124	.9
63.00000	47.00000	31.00000	-.3	168.2	7.5	125	.1
67.00000	68.00000	31.00000	-.3	166.9	7.2	134	-1.5
64.00000	106.0000	21.00000	.3	163.9	7.5	138	-2.8
40.00000	64.00000	17.00000	0	164.5	7.5	128	.5
49.00000	55.00000	12.00000	-.1	165.9	7.4	129	1.3
68.00000	64.00000	37.00000	-.1	164.2	7.3	135	-.5
69.00000	66.00000	25.00000	-.2	165.3	7.1	137	.9
86.00000	63.00000	30.00000	.1	164.3	7.2	145	-1
101.0000	63.00000	36.00000	.2	165.5	7.4	140	1.4
87.00000	52.00000	27.00000	-.1	166.5	7.3	141	1
100.0000	159.0000	38.00000	0	167.2	7.3	141	.7
65.00000	68.00000	45.00000	0	165.9	7.3	132	-1.3
74.00000	60.00000	42.00000	0	166.9	7.3	132	1
69.00000	69.00000	42.00000	0	167.3	7.3	141	.4
58.00000	64.00000	32.00000	0	168.5	7.3	141	.8
50.00000	36.00000	29.00000	-.2	169.3	7.1	134	.8
50.00000	41.00000	22.00000	0	170.2	7.1	136	.9
58.00000	33.00000	24.00000	0	171.2	7.1	140	1

FILE: NRLSEP7L DATA

ACC	NSPD	SPD	UNCHG	IND	UN	HW	INDCHG
75.00000	102.0000	27.00000	-.4	162.5	8.4	114	.1
108.0000	236.0000	14.00000	-.2	163.4	8.2	121	.9
110.0000	176.0000	12.00000	-.2	164.5	8.0	123	.9
77.00000	128.0000	7.000000	-.2	166.5	7.8	129	2.0
118.0000	349.0000	14.00000	0	167.2	7.8	124	.7
74.00000	139.0000	6.000000	0	168.1	7.8	124	.9
63.00000	91.00000	13.00000	-.3	168.2	7.5	125	.1
67.00000	78.00000	23.00000	-.3	166.9	7.2	134	-1.5
64.00000	108.0000	15.00000	.3	163.9	7.5	138	-2.8
40.00000	68.00000	10.00000	0	164.5	7.5	128	.5
49.00000	63.00000	10.00000	-.1	165.9	7.4	129	1.3
68.00000	69.00000	24.00000	-.1	164.2	7.3	135	-.5
69.00000	85.00000	10.00000	-.2	165.3	7.1	137	.9
86.00000	69.00000	20.00000	.1	164.3	7.2	145	-1
101.0000	67.00000	21.00000	.2	165.5	7.4	140	1.4
87.00000	57.00000	18.00000	-.1	166.5	7.3	141	1
100.0000	224.0000	11.00000	0	167.2	7.3	141	.7
65.00000	98.00000	28.00000	0	165.9	7.3	132	-1.3
74.00000	65.00000	36.00000	0	166.9	7.3	132	1
69.00000	85.00000	24.00000	0	167.3	7.3	141	.4
58.00000	82.00000	21.00000	0	168.5	7.3	141	.8
50.00000	46.00000	26.00000	-.2	169.3	7.1	134	.8
50.00000	50.00000	22.00000	0	170.2	7.1	136	.9
58.00000	37.00000	18.00000	0	171.2	7.1	140	1

FILE: NRLSEP8L DATA

ACC	NSPD	SPD	UNCHG	IND	UN	HW	INDCHG
75.00000	161.0000	20.00000	-.4	162.4	8.8	111	2.4
108.0000	261.0000	13.00000	-.4	162.5	8.4	114	.1
110.0000	182.0000	7.000000	-.2	163.4	8.2	121	.9
77.00000	135.0000	3.000000	-.2	164.5	8.0	123	.9
118.0000	378.0000	14.00000	-.2	166.5	7.8	129	2.0
74.00000	171.0000	4.000000	0	167.2	7.8	124	.7
63.00000	120.0000	12.00000	0	168.1	7.8	124	.9
67.00000	104.0000	14.00000	-.3	168.2	7.5	125	.1
64.00000	118.0000	12.00000	-.3	166.9	7.2	134	-1.5
40.00000	71.00000	10.00000	.3	163.9	7.5	138	-2.8
49.00000	68.00000	7.000000	0	164.5	7.5	128	.5
68.00000	87.00000	16.00000	-.1	165.9	7.4	129	1.3
69.00000	109.0000	11.00000	-.1	164.2	7.3	135	-.5
86.00000	80.00000	20.00000	-.2	165.3	7.1	137	.9
101.0000	70.00000	12.00000	.1	164.3	7.2	145	-1
87.00000	61.00000	11.00000	.2	165.5	7.4	140	1.4
100.0000	248.0000	7.000000	-.1	166.5	7.3	141	1
65.00000	135.0000	9.000000	0	167.2	7.3	141	.7
74.00000	95.00000	25.00000	0	165.9	7.3	132	-1.3
69.00000	96.00000	21.00000	0	166.9	7.3	132	1
58.00000	88.00000	10.00000	0	167.3	7.3	141	.4
50.00000	61.00000	20.00000	0	168.5	7.3	141	.8
50.00000	61.00000	17.00000	-.2	169.3	7.1	134	.8
58.00000	50.00000	20.00000	0	170.2	7.1	136	.9

FILE: NRLSEP9L DATA

ACC	NSPD	SPD	UNCHG	IND	UN	HW	INDCHG
75.00000	262.0000	11.00000	0	158.9	9.5	97	.7
108.0000	290.0000	14.00000	-.3	160.0	9.2	98	1.1
110.0000	212.0000	6.000000	-.4	162.4	8.8	111	2.4
77.00000	161.0000	3.000000	-.4	162.5	8.4	114	.1
118.0000	398.0000	7.000000	-.2	163.4	8.2	121	.9
74.00000	182.0000	4.000000	-.2	164.5	8.0	123	.9
63.00000	139.0000	6.000000	-.2	166.5	7.8	129	2.0
67.00000	129.0000	13.00000	0	167.2	7.8	124	.7
64.00000	132.0000	11.00000	0	168.1	7.8	124	.9
40.00000	82.00000	7.000000	-.3	168.2	7.5	125	.1
49.00000	71.00000	7.000000	-.3	166.9	7.2	134	-1.5
68.00000	98.00000	12.00000	.3	163.9	7.5	138	-2.8
69.00000	121.0000	11.00000	0	164.5	7.5	128	.5
86.00000	82.00000	13.00000	-.1	165.9	7.4	129	1.3
101.0000	84.00000	10.00000	-.1	164.2	7.3	135	-.5
87.00000	66.00000	8.000000	-.2	165.3	7.1	137	.9
100.0000	257.0000	5.000000	.1	164.3	7.2	145	-1
65.00000	147.0000	7.000000	.2	165.5	7.4	140	1.4
74.00000	118.0000	12.00000	-.1	166.5	7.3	141	1
69.00000	120.0000	10.00000	0	167.2	7.3	141	.7
58.00000	96.00000	13.00000	0	165.9	7.3	132	-1.3
50.00000	70.00000	12.00000	0	166.9	7.3	132	1
50.00000	79.00000	17.00000	0	167.3	7.3	141	.4
58.00000	55.00000	19.00000	0	168.5	7.3	141	.8

FILE: NRSEP10L DATA

ACC	NSPD	SPD	UNCHG	IND	UN	HW	INDCHG
75.00000	297.0000	10.00000	0	158.9	9.5	97	.7
108.0000	43.00000	11.00000	-.3	160.0	9.2	98	1.1
110.0000	245.0000	5.000000	-.4	162.4	8.8	111	2.4
77.00000	189.0000	1.000000	-.4	162.5	8.4	114	.1
118.0000	414.0000	7.000000	-.2	163.4	8.2	121	.9
74.00000	192.0000	6.000000	-.2	164.5	8.0	123	.9
63.00000	154.0000	6.000000	-.2	166.5	7.8	129	2.0
67.00000	141.0000	10.00000	0	167.2	7.8	124	.7
64.00000	156.0000	10.00000	0	168.1	7.8	124	.9
40.00000	102.0000	4.000000	-.3	168.2	7.5	125	.1
49.00000	80.00000	5.000000	-.3	166.9	7.2	134	-1.5
68.00000	108.0000	12.00000	.3	163.9	7.5	138	-2.8
69.00000	125.0000	8.000000	0	164.5	7.5	128	.5
86.00000	103.0000	11.00000	-.1	165.9	7.4	129	1.3
101.0000	89.00000	7.000000	-.1	164.2	7.3	135	-.5
87.00000	69.00000	6.000000	-.2	165.3	7.1	137	.9
100.0000	275.0000	5.000000	.1	164.3	7.2	145	-1
65.00000	151.0000	4.000000	.2	165.5	7.4	140	1.4
74.00000	127.0000	7.000000	-.1	166.5	7.3	141	1
69.00000	148.0000	7.000000	0	167.2	7.3	141	.7
58.00000	108.0000	12.00000	0	165.9	7.3	132	-1.3
50.00000	72.00000	12.00000	0	166.9	7.3	132	1
50.00000	91.00000	8.000000	0	167.3	7.3	141	.4
58.00000	67.00000	19.00000	0	168.5	7.3	141	.8

FILE: NRSEP11L DATA

ACC	NSPD	SPD	UNCHG	IND	UN	HW	INDCHG
75.00000	305.0000	9.000000	-.5	158.2	9.5	100	.9
108.0000	461.0000	11.00000	0	158.9	9.5	97	.7
110.0000	377.0000	4.000000	-.3	160.0	9.2	98	1.1
77.00000	203.0000	0.0000000E+00	-.4	162.4	8.8	111	2.4
118.0000	451.0000	4.000000	-.4	162.5	8.4	114	.1
74.00000	202.0000	5.000000	-.2	163.4	8.2	121	.9
63.00000	164.0000	4.000000	-.2	164.5	8.0	123	.9
67.00000	163.0000	8.000000	-.2	166.5	7.8	129	2.0
64.00000	174.0000	6.000000	0	167.2	7.8	124	.7
40.00000	116.0000	4.000000	0	168.1	7.8	124	.9
49.00000	98.00000	4.000000	-.3	168.2	7.5	125	.1
68.00000	130.0000	10.00000	-.3	166.9	7.2	134	-1.5
69.00000	133.0000	8.000000	.3	163.9	7.5	138	-2.8
86.00000	108.0000	9.000000	0	164.5	7.5	128	.5
101.0000	105.0000	6.000000	-.1	165.9	7.4	129	1.3
87.00000	74.00000	6.000000	-.1	164.2	7.3	135	-.5
100.0000	296.0000	5.000000	-.2	165.3	7.1	137	.9
65.00000	162.0000	4.000000	.1	164.3	7.2	145	-1
74.00000	135.0000	5.000000	.2	165.5	7.4	140	1.4
69.00000	154.0000	5.000000	-.1	166.5	7.3	141	1
58.00000	128.0000	5.000000	0	167.2	7.3	141	.7
50.00000	94.00000	12.00000	0	165.9	7.3	132	-1.3
50.00000	97.00000	7.000000	0	166.9	7.3	132	1
58.00000	77.00000	9.000000	0	167.3	7.3	141	.4

FILE: NRSEP12L DATA

ACC	NSPD	SPD	UNCHG	IND	UN	HW	INDCHG
75.00000	329.0000	11.00000	-.1	154.4	10.1	87	1.9
108.0000	493.0000	13.00000	-.1	157.3	10.0	92	2.9
110.0000	418.0000	4.000000	-.5	158.2	9.5	100	.9
77.00000	333.0000	1.000000	0	158.9	9.5	97	.7
118.0000	480.0000	3.000000	-.3	160.0	9.2	98	1.1
74.00000	233.0000	3.000000	-.4	162.4	8.8	111	2.4
63.00000	174.0000	3.000000	-.4	162.5	8.4	114	.1
67.00000	169.0000	2.000000	-.2	163.4	8.2	121	.9
64.00000	194.0000	5.000000	-.2	164.5	8.0	123	.9
40.00000	129.0000	4.000000	-.2	166.5	7.8	129	2.0
49.00000	114.0000	4.000000	0	167.2	7.8	124	.7
68.00000	149.0000	6.000000	0	168.1	7.8	124	.9
69.00000	147.0000	6.000000	-.3	168.2	7.5	125	.1
86.00000	110.0000	11.00000	-.3	166.9	7.2	134	-1.5
101.0000	111.0000	5.000000	.3	163.9	7.5	138	-2.8
87.00000	82.00000	7.000000	0	164.5	7.5	128	.5
100.0000	310.0000	5.000000	-.1	165.9	7.4	129	1.3
65.00000	174.0000	1.000000	-.1	164.2	7.3	135	-.5
74.00000	146.0000	4.000000	-.2	165.3	7.1	137	.9
69.00000	157.0000	3.000000	.1	164.3	7.2	145	-1
58.00000	141.0000	4.000000	.2	165.5	7.4	140	1.4
50.00000	111.0000	6.000000	-.1	166.5	7.3	141	1
50.00000	110.0000	5.000000	0	167.2	7.3	141	.7
58.00000	86.00000	6.000000	0	165.9	7.3	132	-1.3

APPENDIX D

PEARSON CORRELATION TEST OF ECONOMIC VARIABLES CONSIDERED IN ANALYSIS

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03 DEC 87   NRLRET6L REGRESSION
08:01:08    NAVAL POSTGRADUATE SCHOOL      IBM 3033AP      VM/SP CMS

 - - - -  P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S  - - - - - - - - - - - - -


               VOL         MAND        ACC          HW          UN          IND

VOL          1.0000       .1561       .9366      -.1745       .4722      -.2351
            (   24)     (   24)     (   24)     (   24)     (   24)     (   24)
            P= .        P= .233     P= .000     P= .207     P= .010     P= .134

MAND          .1561      1.0000       .2584       .5293      -.3670       .1256
            (   24)     (   24)     (   24)     (   24)     (   24)     (   24)
            P= .233     P= .        P= .111     P= .004     P= .039     P= .279

ACC           .9366       .2584      1.0000      -.2141       .5443      -.3947
            (   24)     (   24)     (   24)     (   24)     (   24)     (   24)
            P= .000     P= .111     P= .        P= .158     P= .003     P= .028

HW           -.1745       .5293      -.2141      1.0000      -.8328       .3293
            (   24)     (   24)     (   24)     (   24)     (   24)     (   24)
            P= .207     P= .004     P= .158     P= .        P= .000     P= .058

UN            .4722      -.3670       .5443      -.8328      1.0000      -.5428
            (   24)     (   24)     (   24)     (   24)     (   24)     (   24)
            P= .010     P= .039     P= .003     P= .000     P= .        P= .003

IND          -.2351       .1256      -.3947       .3293      -.5428      1.0000
            (   24)     (   24)     (   24)     (   24)     (   24)     (   24)
            P= .134     P= .279     P= .028     P= .058     P= .003     P= .

(COEFFICIENT / (CASES) / 1-TAILED SIG)       " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED
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03 DEC 87   NRLRET9L REGRESSION
07:53:44    NAVAL POSTGRADUATE SCHOOL      IBM 3033AP      VM/SP CMS

 - - - -  P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S  - - - - - - - - - - - - -


             VOL        MAND        ACC         HW          UN          IND

VOL         1.0000     -.0139      .7885      -.2676       .3267      -.4289
           (   24)    (   24)    (   24)    (   24)    (   24)    (   24)
           P= .       P= .474    P= .000    P= .103    P= .060    P= .018

MAND        -.0139     1.0000      .0621      -.3411       .3899      -.3723
           (   24)    (   24)    (   24)    (   24)    (   24)    (   24)
           P= .474    P= .       P= .387    P= .051    P= .030    P= .037

ACC          .7885      .0621     1.0000      -.5013       .5064      -.6124
           (   24)    (   24)    (   24)    (   24)    (   24)    (   24)
           P= .000    P= .387    P= .       P= .006    P= .006    P= .001

HW          -.2676     -.3411     -.5013      1.0000      -.9450       .7168
           (   24)    (   24)    (   24)    (   24)    (   24)    (   24)
           P= .103    P= .051    P= .006    P= .       P= .000    P= .000

UN           .3267      .3899      .5064      -.9450      1.0000      -.7964
           (   24)    (   24)    (   24)    (   24)    (   24)    (   24)
           P= .060    P= .030    P= .006    P= .000    P= .       P= .000

IND         -.4289     -.3723     -.6124       .7168      -.7964      1.0000
           (   24)    (   24)    (   24)    (   24)    (   24)    (   24)
           P= .018    P= .037    P= .001    P= .000    P= .000    P= .

(COEFFICIENT / (CASES) / 1-TAILED SIG)         " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED
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03 DEC 87   NRRET12L REGRESSION
07:54:51    NAVAL POSTGRADUATE SCHOOL      IBM 3033AP       VM/SP CMS

- - - - - - - - - - - - - -  P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S  - - - - -

                 VOL        MAND       ACC        HW         UN         IND

VOL             1.0000      .2136      .6078     -.3785      .3826     -.4500
               (   24)    (   24)    (   24)    (   24)    (   24)    (   24)
               P= .       P= .158    P= .001    P= .034    P= .032    P= .014

MAND             .2136     1.0000      .6559     -.7019      .7543     -.7614
               (   24)    (   24)    (   24)    (   24)    (   24)    (   24)
               P= .158    P= .       P= .000    P= .000    P= .000    P= .000

ACC              .6078      .6559     1.0000     -.5494      .5512     -.5745
               (   24)    (   24)    (   24)    (   24)    (   24)    (   24)
               P= .001    P= .000    P= .       P= .003    P= .003    P= .002

HW              -.3785     -.7019     -.5494     1.0000     -.9709      .8454
               (   24)    (   24)    (   24)    (   24)    (   24)    (   24)
               P= .034    P= .000    P= .003    P= .       P= .000    P= .000

UN               .3826      .7543      .5512     -.9709     1.0000     -.9048
               (   24)    (   24)    (   24)    (   24)    (   24)    (   24)
               P= .032    P= .000    P= .003    P= .000    P= .       P= .000

IND             -.4500     -.7614     -.5745      .8454     -.9048     1.0000
               (   24)    (   24)    (   24)    (   24)    (   24)    (   24)
               P= .014    P= .000    P= .002    P= .000    P= .000    P= .

(COEFFICIENT / (CASES) / 1-TAILED SIG)          " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED
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25 NOV 87   NRLSEP6L REGRESSION
09:20:42    NAVAL POSTGRADUATE SCHOOL      IBM 3033AP      VM/SP CMS

- - - - - - - - - - - - - -  P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S  - - - - - -

               NSPD        SPD        ACC         HW         UN        IND

NSPD          1.0000     -.1283      .7704     -.4141      .5983     -.2870
             (   24)    (   24)    (   24)    (   24)    (   24)    (   24)
             P= .      P= .275    P= .000    P= .022    P= .001    P= .087

SPD           -.1283     1.0000      .1584      .1841     -.1731     -.0078
             (   24)    (   24)    (   24)    (   24)    (   24)    (   24)
             P= .275   P= .       P= .230    P= .195    P= .209    P= .486

ACC            .7704      .1584     1.0000     -.1704      .4818     -.3264
             (   24)    (   24)    (   24)    (   24)    (   24)    (   24)
             P= .000   P= .230    P= .       P= .213    P= .009    P= .060

HW            -.4141      .1841     -.1704     1.0000     -.8328      .3293
             (   24)    (   24)    (   24)    (   24)    (   24)    (   24)
             P= .022   P= .195    P= .213    P= .       P= .000    P= .058

UN             .5983     -.1731      .4818     -.8328     1.0000     -.5428
             (   24)    (   24)    (   24)    (   24)    (   24)    (   24)
             P= .001   P= .209    P= .009    P= .000    P= .       P= .003

IND           -.2870     -.0078     -.3264      .3293     -.5428     1.0000
             (   24)    (   24)    (   24)    (   24)    (   24)    (   24)
             P= .087   P= .486    P= .060    P= .058    P= .003    P= .

(COEFFICIENT / (CASES) / 1-TAILED SIG)          " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED
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25 NOV 87   NRLSEP9L REGRESSION
09:17:33    NAVAL POSTGRADUATE SCHOOL      IBM 3033AP      VM/SP CMS

- - - - - - - - - - - - - - -  P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S  - - - - - -

                 NSPD        SPD         ACC         HW          UN          IND

NSPD            1.0000      -.3359       .7011      -.5676       .6883      -.6819
               (   24)     (   24)     (   24)     (   24)     (   24)     (   24)
               P= .        P= .054     P= .000     P= .002     P= .000     P= .000

SPD             -.3359      1.0000      -.2536       .1469      -.1452       .2495
               (   24)     (   24)     (   24)     (   24)     (   24)     (   24)
               P= .054     P= .        P= .116     P= .247     P= .249     P= .120

ACC              .7011      -.2536      1.0000      -.3471       .4359      -.6498
               (   24)     (   24)     (   24)     (   24)     (   24)     (   24)
               P= .000     P= .116     P= .        P= .048     P= .017     P= .000

HW              -.5676       .1469      -.3471      1.0000      -.9450       .7168
               (   24)     (   24)     (   24)     (   24)     (   24)     (   24)
               P= .002     P= .247     P= .048     P= .        P= .000     P= .000

UN               .6883      -.1452       .4359      -.9450      1.0000      -.7964
               (   24)     (   24)     (   24)     (   24)     (   24)     (   24)
               P= .000     P= .249     P= .017     P= .000     P= .        P= .000

IND             -.6819       .2495      -.6498       .7168      -.7964      1.0000
               (   24)     (   24)     (   24)     (   24)     (   24)     (   24)
               P= .000     P= .120     P= .000     P= .000     P= .000     P= .

(COEFFICIENT / (CASES) / 1-TAILED SIG)         " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED
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25 NOV 87   NRSEP12L REGRESSION
09:22:31    NAVAL POSTGRADUATE SCHOOL     IBM 3033AP      VM/SP CMS

- - - - - - - - - - - - - -  P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S  - - - - - -

              NSPD        SPD         ACC         HW          UN          IND

NSPD         1.0000       .1487       .7087      -.8251       .8365      -.7919
            (   24)     (   24)     (   24)     (   24)     (   24)     (   24)
            P= .        P= .244     P= .000     P= .000     P= .000     P= .000

SPD           .1487      1.0000       .2458      -.2251       .2142      -.1894
            (   24)     (   24)     (   24)     (   24)     (   24)     (   24)
            P= .244     P= .        P= .123     P= .145     P= .157     P= .188

ACC           .7087       .2458      1.0000      -.4882       .4617      -.5375
            (   24)     (   24)     (   24)     (   24)     (   24)     (   24)
            P= .000     P= .123     P= .        P= .008     P= .012     P= .003

HW           -.8251      -.2251      -.4882      1.0000      -.9709       .8454
            (   24)     (   24)     (   24)     (   24)     (   24)     (   24)
            P= .000     P= .145     P= .008     P= .        P= .000     P= .000

UN            .8365       .2142       .4617      -.9709      1.0000      -.9048
            (   24)     (   24)     (   24)     (   24)     (   24)     (   24)
            P= .000     P= .157     P= .012     P= .000     P= .        P= .000

IND          -.7919      -.1894      -.5375       .8454      -.9048      1.0000
            (   24)     (   24)     (   24)     (   24)     (   24)     (   24)
            P= .000     P= .188     P= .003     P= .000     P= .000     P= .

(COEFFICIENT / (CASES) / 1-TAILED SIG)        " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED
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APPENDIX E

REGRESSION RESULTS

```
                   TITLE NRLRET6L REGRESSION

MULTIPLE R            .97867        ANALYSIS OF VARIANCE
R SQUARE              .95779                           DF      SUM OF SQUARES      MEAN SQUARE
ADJUSTED R SQUARE     .94289        REGRESSION          6        182116.42202      30352.73700
STANDARD ERROR      21.72837        RESIDUAL           17          8026.07798        472.12223

                                    F =      64.29000       SIGNIF F =  .0000


------------------- VARIABLES IN THE EQUATION -------------------
VARIABLE                B          SE B        BETA          T  SIG T

UN              60.517820    17.553736     .236886      3.448  .0031
Q3             -17.000141    13.844359    -.082703     -1.228  .2362
Q1               1.030608    13.302150     .005014       .077  .9391
MAND             1.775684      .669712     .173788      2.651  .0168
VOL              1.616066      .195241     .694439      8.277  .0000
Q2              32.721589    19.489060     .159185      1.679  .1114
(CONSTANT)    -411.517625   130.145664                 -3.162  .0057
```

```
                 TITLE NRLRET7L REGRESSION

MULTIPLE R              .93931        ANALYSIS OF VARIANCE
R SQUARE                .88230                            DF      SUM OF SQUARES       MEAN SQUARE
ADJUSTED R SQUARE       .84076        REGRESSION           6      167763.19996       27960.53333
STANDARD ERROR        36.28263        RESIDUAL            17       22379.30004        1316.42941

                                      F =       21.23968        SIGNIF F =  .0000


------------------ VARIABLES IN THE EQUATION ------------------
VARIABLE              B           SE B        BETA          T  SIG T

Q3           -12.324478      23.761334   -.059956       -.519  .6107
UN            48.529037      25.721882    .189958       1.887  .0764
Q1             8.561401      21.303305    .041650        .402  .6928
MAND           -.180941       1.947915   -.008697       -.093  .9271
VOL            1.831093        .428277    .555028       4.275  .0005
Q2            80.738125      28.578922    .392776       2.825  .0117
(CONSTANT)  -293.111430     191.194349                 -1.533  .1437
```

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                 TITLE NRLRET8L REGRESSION

MULTIPLE R           .93141          ANALYSIS OF VARIANCE
R SQUARE             .86753                              DF      SUM OF SQUARES      MEAN SQUARE
ADJUSTED R SQUARE    .82078          REGRESSION           6        164954.45877      27492.40979
STANDARD ERROR     38.49220          RESIDUAL            17         25188.04123       1481.64948

                                     F =      18.55527       SIGNIF F =  .0000

------------------ VARIABLES IN THE EQUATION ------------------
VARIABLE              B        SE B       BETA         T  SIG T

Q3            -5.822478   26.322535  -.028325     -.221  .8276
UN            39.889748   21.182462   .192677     1.883  .0769
VOL            2.296519     .546789   .525619     4.200  .0006
MAND           -.256428    2.807468  -.009624     -.091  .9283
Q1             9.427419   22.737457   .045863      .415  .6836
Q2            94.994454   31.187513   .462131     3.046  .0073
(CONSTANT)  -236.368506  161.246219               -1.466  .1609
```

```
          TITLE NRLRET9L REGRESSION

MULTIPLE R           .93404        ANALYSIS OF VARIANCE
R SQUARE             .87244                              DF      SUM OF SQUARES       MEAN SQUARE
ADJUSTED R SQUARE    .82742        REGRESSION             6        165887.68047       27647.94674
STANDARD ERROR     37.77240        RESIDUAL              17         24254.81953        1426.75409

                                   F =       19.37821       SIGNIF F =  .0000


------------------ VARIABLES IN THE EQUATION ------------------
VARIABLE                B          SE B         BETA          T  SIG T

UN              33.779338    14.148450     .242816      2.387  .0288
Q1              20.934663    23.163548     .101843       .904  .3787
Q3              10.067871    23.210019     .048978       .434  .6699
MAND            -1.524896     1.854107    -.081264      -.822  .4222
VOL              2.721504      .721620     .453336      3.771  .0015
Q2             111.751619    26.382899     .543651      4.236  .0006
(CONSTANT)    -196.373598   101.543237                 -1.934  .0700
```

```
                TITLE NRRET10L REGRESSION

MULTIPLE R             .93361         ANALYSIS OF VARIANCE
R SQUARE               .87163                             DF       SUM OF SQUARES      MEAN SQUARE
ADJUSTED R SQUARE      .82633         REGRESSION           6         165734.64367      27622.44061
STANDARD ERROR       37.89137         RESIDUAL            17          24407.85633       1435.75625

                                      F =       19.23895        SIGNIF F =  .0000


------------------ VARIABLES IN THE EQUATION ------------------
VARIABLE                B          SE B         BETA          T  SIG T

Q3               6.190464     23.397427      .030115       .265  .7945
UN              41.958038     18.122403      .301607      2.315  .0334
Q1              11.000217     22.551434      .053514       .488  .6319
VOL              3.215136       .898168      .427901      3.580  .0023
MAND            -1.944079      2.078676     -.123147      -.935  .3628
Q2             112.218029     27.490563      .545920      4.082  .0008
(CONSTANT)    -252.222875    127.990009                  -1.971  .0653
```

```
                 TITLE NRRET11L REGRESSION

MULTIPLE R             .94714         ANALYSIS OF VARIANCE
R SQUARE               .89708                               DF      SUM OF SQUARES       MEAN SQUARE
ADJUSTED R SQUARE      .86075         REGRESSION             6        170572.69500       28428.78250
STANDARD ERROR       33.92882         RESIDUAL              17         19569.80500        1151.16500

                                      F =       24.69566       SIGNIF F =  .0000


------------------ VARIABLES IN THE EQUATION ------------------
VARIABLE                B          SE B        BETA          T  SIG T

Q3              23.813215   20.117958     .115847      1.184  .2528
VOL              4.403473     .994506     .440988      4.428  .0004
MAND             3.804971    1.237375     .398091      3.075  .0069
Q1               -.085580   19.870281 -4.163E-04      -.004  .9966
Q2              98.235440   23.970878     .477898      4.098  .0007
UN              -6.580021   15.823439    -.053550      -.416  .6827
(CONSTANT)      86.641605  113.849093                   .761  .4571
```

```
          TITLE NRRET12L REGRESSION

MULTIPLE R             .91494          ANALYSIS OF VARIANCE
R SQUARE               .83712                             DF      SUM OF SQUARES       MEAN SQUARE
ADJUSTED R SQUARE      .77963          REGRESSION          6        159171.90782       26528.65130
STANDARD ERROR       42.68254          RESIDUAL           17         30970.59218        1821.79954

                                       F =      14.56178       SIGNIF F =  .0000


------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE                B          SE B         BETA          T  SIG T

UN               6.705556     16.215690      .070099       .414  .6844
Q3              19.021186     25.961217      .092535       .733  .4737
Q1              -3.744207     25.053906     -.018215      -.149  .8830
VOL              5.428588      2.082144      .312104      2.607  .0184
Q2             113.948474     31.404935      .554339      3.628  .0021
MAND             2.082003      1.504901      .257032      1.383  .1844
(CONSTANT)       1.841626    117.601889                    .016  .9877
```

```
             TITLE NRLSEP6L REGRESSION

MULTIPLE R           .96713      ANALYSIS OF VARIANCE
R SQUARE             .93535                         DF      SUM OF SQUARES      MEAN SQUARE
ADJUSTED R SQUARE    .91253      REGRESSION          6          9350.95977       1558.49330
STANDARD ERROR      6.16620      RESIDUAL           17           646.37356         38.02197

                                 F =      40.98928      SIGNIF F =  .0000

------------------ VARIABLES IN THE EQUATION ------------------
VARIABLE              B          SE B        BETA          T  SIG T

UN            -4.036233      4.687341    -.068902      -.861  .4012
Q3             7.138798      3.971658     .151457      1.797  .0901
Q1             8.766716      3.643391     .185995      2.406  .0278
SPD             .841421       .152481     .389291      5.518  .0000
Q2            30.922021      3.838487     .656043      8.056  .0000
NSPD            .256383       .030655     .720346      8.364  .0000
(CONSTANT)    46.019693     33.750203                  1.364  .1905
```

```
                 TITLE NRLSEP7L REGRESSION

MULTIPLE R           .94007          ANALYSIS OF VARIANCE
R SQUARE             .88373                              DF      SUM OF SQUARES      MEAN SQUARE
ADJUSTED R SQUARE    .84270          REGRESSION           6          8834.97251      1472.49542
STANDARD ERROR      8.26887          RESIDUAL            17          1162.36083        68.37417

                                     F =      21.53584       SIGNIF F =  .0000


------------------ VARIABLES IN THE EQUATION ------------------
VARIABLE              B        SE B       BETA         T  SIG T

Q3             7.814134    5.344547    .165785     1.462  .1620
SPD             .684863     .254423    .248085     2.692  .0154
UN            -5.459290    6.256666   -.093194     -.873  .3951
Q1             7.163311    4.858149    .151977     1.474  .1586
Q2            31.726317    5.128106    .673107     6.187  .0000
NSPD            .225759     .035634    .788634     6.336  .0000
(CONSTANT)    66.789087   44.782125                1.491  .1542
```

```
                TITLE NRLSEP8L REGRESSION

MULTIPLE R             .93992          ANALYSIS OF VARIANCE
R SQUARE               .88344                              DF       SUM OF SQUARES       MEAN SQUARE
ADJUSTED R SQUARE      .84230          REGRESSION           6           8832.06638        1472.01106
STANDARD ERROR        8.27920          RESIDUAL            17           1165.26695          68.54511

                                       F =       21.47507       SIGNIF F =  .0000


------------------ VARIABLES IN THE EQUATION ------------------
VARIABLE                B         SE B         BETA         T  SIG T

Q3               6.278723     5.581630      .133210     1.125  .2763
UN              -7.810049     5.057738     -.164520    -1.544  .1410
SPD               .602399      .319603      .166597     1.885  .0767
Q1               4.599941     4.878188      .097592      .943  .3589
Q2              33.058326     5.095472      .701367     6.488  .0000
NSPD              .209094      .032548      .779505     6.424  .0000
(CONSTANT)      87.920331    36.478939                  2.410  .0276
```

```
         TITLE NRLSEP9L REGRESSION

MULTIPLE R           .94711        ANALYSIS OF VARIANCE
R SQUARE             .89701                             DF      SUM OF SQUARES      MEAN SQUARE
ADJUSTED R SQUARE    .86066        REGRESSION            6          8967.70724       1494.61787
STANDARD ERROR      7.78243        RESIDUAL             17          1029.62609         60.56624

                                   F =      24.67741       SIGNIF F =  .0000


------------------ VARIABLES IN THE EQUATION ------------------
VARIABLE              B         SE B         BETA          T  SIG T

UN           -12.812224     4.271528    -.401651     -2.999  .0081
Q1             2.766617     4.652575     .058697       .595  .5599
Q3             5.115747     5.840285     .108536       .876  .3933
SPD             .693479      .497789     .133381      1.393  .1815
Q2            34.609537     4.774637     .734277      7.249  .0000
NSPD            .235578      .035597     .959389      6.618  .0000
(CONSTANT)   121.767027    30.365574                  4.010  .0009
```

```
            TITLE NRSEP10L REGRESSION

MULTIPLE R             .90448          ANALYSIS OF VARIANCE
R SQUARE               .81808                                DF       SUM OF SQUARES        MEAN SQUARE
ADJUSTED R SQUARE      .75387          REGRESSION             6           8178.57011         1363.09502
STANDARD ERROR       10.34341          RESIDUAL              17           1818.76322          106.98607

                                       F =       12.74086         SIGNIF F =  .0000


------------------ VARIABLES IN THE EQUATION ------------------
VARIABLE                B          SE B        BETA          T  SIG T

Q3              16.198569      6.885357     .343669      2.353  .0309
UN              -1.065417      4.274370    -.033400      -.249  .8061
Q1                .734370      6.068650     .015580       .121  .9051
SPD              1.725949       .681213     .310212      2.534  .0214
Q2              41.165076      6.649331     .873360      6.191  .0000
NSPD              .143834       .036034     .595794      3.992  .0009
(CONSTANT)      32.741595     29.916810                  1.094  .2890
```

```
               TITLE NRSEP11L REGRESSION

MULTIPLE R           .94059        ANALYSIS OF VARIANCE
R SQUARE             .88471                          DF      SUM OF SQUARES      MEAN SQUARE
ADJUSTED R SQUARE    .84402        REGRESSION         6          8844.73028       1474.12171
STANDARD ERROR      8.23409        RESIDUAL          17          1152.60305         67.80018

                                   F =      21.74215      SIGNIF F =  .0000


------------------ VARIABLES IN THE EQUATION ------------------
VARIABLE              B         SE B        BETA         T  SIG T

Q3            10.694937     5.604019     .226904     1.908  .0734
UN           -14.005973     4.213887    -.497097    -3.324  .0040
Q1             5.022765     4.892952     .106563     1.027  .3190
SPD             .421594      .711379     .056018      .593  .5612
Q2            32.882510     5.115220     .697636     6.428  .0000
NSPD            .174384      .028291     .938835     6.164  .0000
(CONSTANT)   136.840413    30.228517                 4.527  .0003
```

```
              TITLE NRSEP12L REGRESSION

MULTIPLE R             .90391          ANALYSIS OF VARIANCE
R SQUARE               .81704                              DF      SUM OF SQUARES       MEAN SQUARE
ADJUSTED R SQUARE      .75247          REGRESSION           6          8168.26685        1361.37781
STANDARD ERROR       10.37266          RESIDUAL            17          1829.06648         107.59215

                                       F =       12.65313       SIGNIF F =  .0000


------------------ VARIABLES IN THE EQUATION ------------------
VARIABLE              B          SE B         BETA         T  SIG T

UN           -10.823471      4.605429    -.493450    -2.350  .0311
Q3            13.108623      6.596998     .278113     1.987  .0633
Q1             4.531617      6.472133     .096143      .700  .4933
SPD             .650295       .868406     .093310      .749  .4642
Q2            27.860831      6.714754     .591096     4.149  .0007
NSPD            .155022       .037496     .912358     4.134  .0007
(CONSTANT)   114.919192     31.260152                 3.676  .0019
```

APPENDIX F

MODEL PROJECTIONS OF TEST PERIOD DATA

Six Month Projections

Ret6lin

Constant	Coeff	Un	Coeff	Vol	Coeff	Mand	Qtr
-411.518	60.518	7	1.616	58	1.775	10	32.722
-411.518	60.518	6.9	1.616	110	1.775	14	-17
-411.518	60.518	6.8	1.616	106	1.775	14	-17
-411.518	60.518	7.2	1.616	108	1.775	18	-17
-411.518	60.518	7.2	1.616	149	1.775	20	
-411.518	60.518	7.1	1.616	81	1.775	14	
-411.518	60.518	7.2	1.616	30	1.775	8	
-411.518	60.518	7.1	1.616	55	1.775	8	1.03
-411.518	60.518	7	1.616	57	1.775	7	1.03
-411.518	60.518	6.8	1.616	48	1.775	10	1.03
-411.518	60.518	7	1.616	62	1.775	22	32.722
-411.518	60.518	6.9	1.616	39	1.775	12	32.722

Month	Pred Losses	Rounded	Acc Losses	Error	Percent Error	Absolute Value	Avg % Error
June 86	156.31	156	159	-3	-1.92	1.92	15.3
Jul	191.67	192	262	-70	-36.46	36.46	
Aug	179.15	179	246	-67	-37.43	37.43	
Sep	213.69	214	233	-19	-8.88	8.88	
Oct	300.50	300	283	17	5.67	5.67	
Nov	173.91	174	178	-4	-2.30	2.30	
Dec	86.89	87	87	0	0.00	0.00	
Jan 87	122.27	122	126	-4	-3.28	3.28	
Feb	117.68	118	156	-38	-32.20	32.20	
Mar	96.35	96	134	-38	-39.58	39.58	
Apr	184.07	184	173	11	5.98	5.98	
May	123.10	123	111	12	9.76	9.76	

Seven Month Projections

Ret7lin

Constant	Coeff	Un	Coeff	Vol	Coeff	Mand	Qtr
-293.11	48.53	7.1	1.83	43	-0.18	4	80.74
-293.11	48.53	7	1.83	68	-0.18	12	-12.32
-293.11	48.53	6.9	1.83	84	-0.18	10	-12.32
-293.11	48.53	6.8	1.83	92	-0.18	12	-12.32
-293.11	48.53	7.2	1.83	111	-0.18	89	
-293.11	48.53	7.2	1.83	73	-0.18	13	
-293.11	48.53	7.1	1.83	24	-0.18	6	
-293.11	48.53	7.2	1.83	51	-0.18	7	8.56
-293.11	48.53	7.1	1.83	47	-0.18	7	8.56
-293.11	48.53	7	1.83	39	-0.18	5	8.56
-293.11	48.53	6.8	1.83	53	-0.18	11	80.74
-293.11	48.53	7	1.83	30	-0.18	8	80.74

Month	Pred Losses	Acc Losses	Error	Rounded	Percent Error	Absolute Value	Avg % Error
Jun 86	210.16	159	51.16	51	32.08	32.08	22.4
Jul	156.56	262	-105.44	-105	-40.08	40.08	
Aug	181.35	246	-64.65	-65	-26.42	26.42	
Sep	190.77	233	-42.23	-42	-18.03	18.03	
Oct	243.42	283	-39.58	-40	-14.13	14.13	
Nov	187.56	178	9.56	10	5.62	5.62	
Dec	94.29	87	7.29	7	8.05	8.05	
Jan 87	156.94	126	30.94	31	24.60	24.60	
Feb	144.76	156	-11.24	-11	-7.05	7.05	
Mar	125.63	134	-8.37	-8	-5.97	5.97	
Apr	212.64	173	39.64	40	23.12	23.12	
May	180.80	111	69.80	70	63.06	63.06	

Eight Month Projections

Ret8lin

Constant	Coeff	Un	Coeff	Vol	Coeff	Mand	Qtr
-236.39	39.89	7.1	2.3	39	-0.26	5	95
-236.39	39.89	7.1	2.3	57	-0.26	8	-5.82
-236.39	39.89	7	2.3	67	-0.26	10	-5.82
-236.39	39.89	6.9	2.3	70	-0.26	8	-5.82
-236.39	39.89	6.8	2.3	85	-0.26	8	
-236.39	39.89	7.2	2.3	57	-0.26	10	
-236.39	39.89	7.2	2.3	23	-0.26	6	
-236.39	39.89	7.1	2.3	45	-0.26	7	9.43
-236.39	39.89	7.2	2.3	42	-0.26	7	9.43
-236.39	39.89	7.1	2.3	35	-0.26	5	9.43
-236.39	39.89	7	2.3	47	-0.26	9	95
-236.39	39.89	6.8	2.3	23	-0.26	6	95

Month	Pred Losses	Acc Losses	Error	Rounded	Percent Error	Absolute Value	Avg % Error
Jun 86	230.23	159	71.23	71	44.65	44.65	24.1
Jul	170.03	262	-91.97	-92	-35.11	35.11	
Aug	188.52	246	-57.48	-57	-23.17	23.17	
Sep	191.95	233	-41.05	-41	-17.60	17.60	
Oct	228.28	283	-54.72	-55	-19.43	19.43	
Nov	179.32	178	1.32	1	0.56	0.56	
Dec	102.16	87	15.16	15	17.24	17.24	
Jan 87	157.94	126	31.94	32	25.40	25.40	
Feb	155.03	156	-0.97	-1	-0.64	0.64	
Mar	135.46	134	1.46	1	0.75	0.75	
Apr	243.60	173	70.60	71	41.04	41.04	
May	181.20	111	70.20	70	63.06	63.06	

Nine Month Projections

Ret9lin

Constant	Coeff	Un	Coeff	Vol	Coeff	Mand	Qtr
-196.374	33.78	7.1	2.722	32	-1.525	5	111.75
-196.374	33.78	7.1	2.722	48	-1.525	7	10.07
-196.374	33.78	7.1	2.722	55	-1.525	10	10.07
-196.374	33.78	7	2.722	59	-1.525	6	10.07
-196.374	33.78	6.9	2.722	74	-1.525	7	
-196.374	33.78	6.8	2.722	46	-1.525	9	
-196.374	33.78	7.2	2.722	19	-1.525	11	
-196.374	33.78	7.2	2.722	39	-1.525	7	20.93
-196.374	33.78	7.1	2.722	39	-1.525	7	20.93
-196.374	33.78	7.2	2.722	28	-1.525	2	20.93
-196.374	33.78	7.1	2.722	44	-1.525	6	111.75
-196.374	33.78	7	2.722	19	-1.525	5	111.75

Month	Pred Losses	Rounded	Acc Losses	Error	Percent Error	Absolute Value	Avg % Error
Jun 86	249.94	250	159	91	36.40	36.40	22.7
Jul	194.87	195	262	-67	-34.36	34.36	
Aug	218.49	218	246	-28	-12.84	12.84	
Sep	219.90	220	233	-13	-5.91	5.91	
Oct	248.81	249	283	-34	-13.65	13.65	
Nov	172.27	172	178	-6	-3.49	3.49	
Dec	115.34	115	87	28	24.35	24.35	
Jan 87	184.61	185	126	59	31.89	31.89	
Feb	181.23	181	156	25	13.81	13.81	
Mar	147.04	147	134	13	8.84	8.84	
Apr	284.13	284	173	111	39.08	39.08	
May	211.18	211	111	100	47.39	47.39	

Ten Month Projections

Ret10lin

Constant	Coeff	Un	Coeff	Vol	Coef	Mand	Qtr
-252.22	41.96	7.3	3.22	28	-1.94	5	112.22
-252.22	41.96	7.1	3.22	35	-1.94	7	6.19
-252.22	41.96	7.1	3.22	44	-1.94	5	6.19
-252.22	41.96	7.1	3.22	41	-1.94	4	6.19
-252.22	41.96	7	3.22	60	-1.94	3	
-252.22	41.96	6.9	3.22	37	-1.94	4	
-252.22	41.96	6.8	3.22	16	-1.94	4	
-252.22	41.96	7.2	3.22	34	-1.94	1	11
-252.22	41.96	7.2	3.22	34	-1.94	4	11
-252.22	41.96	7.1	3.22	26	-1.94	2	11
-252.22	41.96	7.2	3.22	40	-1.94	5	112.22
-252.22	41.96	7.1	3.22	17	-1.94	3	112.22

Month	Pred Losses	Acc Losses	Error	Rounded	Percent Error	Absolute Value	Avg % Error
Jun 86	246.77	159	87.77	88	55.35	55.35	31.9
Jul	151.01	262	-110.99	-111	-42.37	42.37	
Aug	183.87	246	-62.13	-62	-25.20	25.20	
Sep	176.15	233	-56.85	-57	-24.46	24.46	
Oct	228.88	283	-54.12	-54	-19.08	19.08	
Nov	148.68	178	-29.32	-29	-16.29	16.29	
Dec	76.87	87	-10.13	-10	-11.49	11.49	
Jan 87	168.43	126	42.43	42	33.33	33.33	
Feb	162.61	156	6.61	7	4.49	4.49	
Mar	136.54	134	2.54	3	2.24	2.24	
Apr	281.21	173	108.21	108	62.43	62.43	
May	206.84	111	95.84	96	86.49	86.49	

Eleven Month Projections

Retillin

Constant	Coeff	Un	Coeff	Vol	Coeff	Mand	Qtr
86.64	-6.58	7.3	4.4	26	3.8	3	98.26
86.64	-6.58	7.3	4.4	33	3.8	2	23.81
86.64	-6.58	7.1	4.4	39	3.8	4	23.81
86.64	-6.58	7.1	4.4	34	3.8	1	23.81
86.64	-6.58	7.1	4.4	46	3.8	1	
86.64	-6.58	7	4.4	23	3.8	2	
86.64	-6.58	6.9	4.4	13	3.8	3	
86.64	-6.58	6.8	4.4	29	3.8	2	-0.09
86.64	-6.58	7.2	4.4	29	3.8	4	-0.09
86.64	-6.58	7.2	4.4	21	3.8	1	-0.09
86.64	-6.58	7.1	4.4	37	3.8	3	98.26
86.64	-6.58	7.2	4.4	15	3.8	1	98.26

Month	Pred Losses	Acc Losses	Error	Rounded	Percent Error	Absolute Value	Avg % Error
Jun 86	262.67	159	103.67	104	65.41	65.41	31.1
Jul	215.22	262	-46.78	-47	-17.94	17.94	
Aug	250.53	246	4.53	5	2.03	2.03	
Sep	217.13	233	-15.87	-16	-6.87	6.87	
Oct	246.12	283	-36.88	-37	-13.07	13.07	
Nov	149.38	178	-28.62	-29	-16.29	16.29	
Dec	109.84	87	22.84	23	26.44	26.44	
Jan 87	177.01	126	51.01	51	40.48	40.48	
Feb	181.97	156	25.97	26	16.67	16.67	
Mar	135.37	134	1.37	1	0.75	0.75	
Apr	312.38	173	139.38	139	80.35	80.35	
May	207.32	111	96.32	96	86.49	86.49	

Twelve Month Projections

Ret12lin

Constant	Coeff	Un	Coeff	Vol	Coeff	Mand	Qtr
1.842	6.706	7.3	5.429	23	2.082	1	113.95
1.842	6.706	7.3	5.429	26	2.082	1	19.02
1.842	6.706	7.3	5.429	27	2.082	3	19.02
1.842	6.706	7.1	5.429	19	2.082	1	19.02
1.842	6.706	7.1	5.429	35	2.082	1	
1.842	6.706	7.1	5.429	13	2.082	1	
1.842	6.706	7	5.429	5	2.082	2	
1.842	6.706	6.9	5.429	12	2.082	1	-3.74
1.842	6.706	6.8	5.429	22	2.082	2	-3.74
1.842	6.706	7.2	5.429	15	2.082	2	-3.74
1.842	6.706	7.2	5.429	32	2.082	0	113.95
1.842	6.706	7.1	5.429	12	2.082	1	113.95

Month	Pred Losses	Rounded	Acc Losses	Error	Percent Error	Absolute Value	Avg % Error
Jun 86	291.69	292	159	133	45.55	45.55	25.5
Jul	213.05	213	262	-49	-23.00	23.00	
Aug	222.64	223	246	-23	-10.31	10.31	
Sep	173.71	174	233	-59	-33.91	33.91	
Oct	241.55	242	283	-41	-16.94	16.94	
Nov	122.11	122	178	-56	-45.90	45.90	
Dec	80.09	80	87	-7	-8.75	8.75	
Jan 87	111.60	112	126	-14	-12.50	12.50	
Feb	167.30	167	156	11	6.59	6.59	
Mar	131.98	132	134	-2	-1.52	1.52	
Apr	337.80	338	173	165	48.82	48.82	
May	230.63	231	111	120	51.95	51.95	

Six Month Projections

Sep6lin

Constant	Coeff	Un	Coeff	Nspd	Coeff	Spd	Qtr
46.2	4.036	7	0.256	89	0.841	45	30.92
46.2	4.036	6.9	0.256	36	0.841	36	7.139
46.2	4.036	6.8	0.256	70	0.841	54	7.139
46.2	4.036	7.2	0.256	92	0.841	28	7.139
46.2	4.036	7.2	0.256	198	0.841	36	
46.2	4.036	7.1	0.256	64	0.841	19	
46.2	4.036	7.2	0.256	52	0.841	22	
46.2	4.036	7.1	0.256	88	0.841	34	8.767
46.2	4.036	7	0.256	67	0.841	27	8.767
46.2	4.036	6.8	0.256	43	0.841	34	8.767
46.2	4.036	7	0.256	69	0.841	17	30.92
46.2	4.036	6.9	0.256	40	0.841	29	30.92

Month	Pred Losses	Rounded	Acc Losses	Error	Percent Error	Absolute Value	Avg % Error
Jun 86	109.50	109	102	7	6.42	6.42	27.4
Jul	64.98	65	82	-17	-26.15	26.15	
Aug	89.23	89	124	-35	-39.33	39.33	
Sep	71.38	71	105	-34	-47.89	47.89	
Oct	98.10	98	138	-40	-40.82	40.82	
Nov	49.91	50	75	-25	-50.00	50.00	
Dec	48.95	49	79	-30	-61.22	61.22	
Jan 87	77.43	77	81	-4	-5.19	5.19	
Feb	66.57	67	55	12	17.91	17.91	
Mar	67.12	67	72	-5	-7.46	7.46	
Apr	80.83	81	71	10	12.35	12.35	
may	83.90	84	72	12	14.29	14.29	

Seven Month Projections

Sep7lin

Constant	Coeff	Un	Coeff	Nspd	Coeff	Spd	Qtr
66.79	-5.46	7.1	0.226	98	0.685	34	31.73
66.79	-5.46	7	0.226	48	0.685	21	7.81
66.79	-5.46	6.9	0.226	75	0.685	23	7.81
66.79	-5.46	6.8	0.226	97	0.685	16	7.81
66.79	-5.46	7.2	0.226	265	0.685	19	
66.79	-5.46	7.2	0.226	82	0.685	15	
66.79	-5.46	7.1	0.226	75	0.685	15	
66.79	-5.46	7.2	0.226	103	0.685	9	7.16
66.79	-5.46	7.1	0.226	77	0.685	12	7.16
66.79	-5.46	7	0.226	65	0.685	18	7.16
66.79	-5.46	6.8	0.226	79	0.685	10	31.73
66.79	-5.46	7	0.226	57	0.685	12	31.73

Month	Pred Losses	Rounded	Acc Losses	Error	Percent Error	Absolute Value	Avg % Error
Jun 86	105.19	105	102	3	2.86	2.86	29.8
Jul	61.61	62	82	-20	-32.26	32.26	
Aug	69.63	70	124	-54	-77.14	77.14	
Sep	70.35	70	105	-35	-50.00	50.00	
Oct	100.38	100	138	-38	-38.00	38.00	
Nov	56.29	56	75	-19	-33.93	33.93	
Dec	55.25	55	79	-24	-43.64	43.64	
Jan 87	64.08	64	81	-17	-26.56	26.56	
Feb	60.81	61	55	6	9.84	9.84	
Mar	62.75	63	72	-9	-14.29	14.29	
Apr	86.10	86	71	15	17.44	17.44	
May	81.40	81	72	9	11.11	11.11	

Eight Month Projections

Sep81in

Constant	Coeff	Un	Coeff	Nspd	Coeff	Spd	Qtr
87.92	-7.81	7.1	0.2	117	0.6	27	33.06
87.92	-7.81	7.1	0.2	58	0.6	13	6.28
87.92	-7.81	7	0.2	83	0.6	16	6.28
87.92	-7.81	6.9	0.2	101	0.6	12	6.28
87.92	-7.81	6.8	0.2	288	0.6	14	
87.92	-7.81	7.2	0.2	140	0.6	5	
87.92	-7.81	7.2	0.2	97	0.6	11	
87.92	-7.81	7.1	0.2	120	0.6	5	4.6
87.92	-7.81	7.2	0.2	85	0.6	5	4.6
87.92	-7.81	7.1	0.2	71	0.6	14	4.6
87.92	-7.81	7	0.2	115	0.6	9	33.06
87.92	-7.81	6.8	0.2	65	0.6	10	33.06

Month	Pred Losses	Rounded	Acc Losses	Error	Percent Error	Absolute Value	Avg % Error
Jun 86	105.13	105	102	3	2.86	2.86	30.8
Jul	58.15	58	82	-24	-41.38	41.38	
Aug	65.73	66	124	-58	-87.88	87.88	
Sep	67.71	68	105	-37	-54.41	54.41	
Oct	100.81	101	138	-37	-36.63	36.63	
Nov	62.69	63	75	-12	-19.05	19.05	
Dec	57.69	58	79	-21	-36.21	36.21	
Jan 87	64.07	64	81	-17	-26.56	26.56	
Feb	56.29	56	55	1	1.79	1.79	
Mar	59.67	60	72	-12	-20.00	20.00	
Apr	94.71	95	71	24	25.26	25.26	
May	86.87	87	72	15	17.24	17.24	

Nine Month Projections

Sep9lin

Constant	Coeff	Un	Coeff	Nspd	Coeff	Spd	Qtr
121.77	-12.812	7.1	0.236	137	0.693	31	34.61
121.77	-12.812	7.1	0.236	65	0.693	13	5.12
121.77	-12.812	7.1	0.236	90	0.693	13	5.12
121.77	-12.812	7	0.236	108	0.693	9	5.12
121.77	-12.812	6.9	0.236	298	0.693	6	
121.77	-12.812	6.8	0.236	151	0.693	5	
121.77	-12.812	7.2	0.236	129	0.693	8	
121.77	-12.812	7.2	0.236	142	0.693	3	2.77
121.77	-12.812	7.1	0.236	97	0.693	5	2.77
121.77	-12.812	7.2	0.236	88	0.693	3	2.77
121.77	-12.812	7.1	0.236	124	0.693	7	34.61
121.77	-12.812	7	0.236	100	0.693	7	34.61

Month	Pred Losses	Rounded	Acc Losses	Error	Percent Error	Absolute Value	Avg % Error
Jun 86	119.23	119	102	17	16.67	16.67	23.8
Jul	60.27	60	82	-22	-26.83	26.83	
Aug	66.17	66	124	-58	-46.77	46.77	
Sep	68.93	69	105	-36	-34.29	34.29	
Oct	107.85	108	138	-30	-21.74	21.74	
Nov	73.75	74	75	-1	-1.33	1.33	
Dec	65.51	66	79	-13	-16.46	16.46	
Jan 87	67.88	68	81	-13	-16.05	16.05	
Feb	59.93	60	55	5	9.09	9.09	
Mar	55.14	55	72	-17	-23.61	23.61	
Apr	99.53	100	71	29	40.85	40.85	
May	95.15	95	72	23	31.94	31.94	

Ten Month Projections

Sep10lin

Constant	Coeff	Un	Coeff	Nspd	Coeff	Spd	Qtr
32.74	-1.07	7.3	0.144	162	1.726	20	41.17
32.74	-1.07	7.1	0.144	76	1.726	11	16.2
32.74	-1.07	7.1	0.144	99	1.726	9	16.2
32.74	-1.07	7.1	0.144	118	1.726	7	16.2
32.74	-1.07	7	0.144	315	1.726	4	
32.74	-1.07	6.9	0.144	158	1.726	4	
32.74	-1.07	6.8	0.144	136	1.726	7	
32.74	-1.07	7.2	0.144	205	1.726	2	0.734
32.74	-1.07	7.2	0.144	108	1.726	3	0.734
32.74	-1.07	7.1	0.144	96	1.726	2	0.734
32.74	-1.07	7.2	0.144	134	1.726	4	41.17
32.74	-1.07	7.1	0.144	105	1.726	6	41.17

Month	Pred Losses	Rounded	Acc Losses	Error	Percent Error	Absolute Value	Avg % Error
Jun 86	123.95	124	102	22	21.57	21.57	29.0
Jul	71.27	71	82	-11	-13.41	13.41	
Aug	71.13	71	124	-53	-42.74	42.74	
Sep	70.42	70	105	-35	-33.33	33.33	
Oct	77.51	78	138	-60	-43.48	43.48	
Nov	55.01	55	75	-20	-26.67	26.67	
Dec	57.13	57	79	-22	-27.85	27.85	
Jan 87	58.74	59	81	-22	-27.16	27.16	
Feb	46.50	47	55	-8	-14.55	14.55	
Mar	43.15	43	72	-29	-40.28	40.28	
Apr	92.41	92	71	21	29.58	29.58	
May	91.79	92	72	20	27.78	27.78	

Eleven Month Projections

Sep11in

Constant	Coeff	Un	Coeff	Nspd	Coeff	Spd	Qtr
136.84	-14.006	7.3	0.174	175	0.422	12	32.88
136.84	-14.006	7.3	0.174	83	0.422	8	10.69
136.84	-14.006	7.1	0.174	108	0.422	7	10.69
136.84	-14.006	7.1	0.174	122	0.422	6	10.69
136.84	-14.006	7.1	0.174	336	0.422	2	
136.84	-14.006	7	0.174	169	0.422	1	
136.84	-14.006	6.9	0.174	143	0.422	4	
136.84	-14.006	6.8	0.174	223	0.422	1	5.023
136.84	-14.006	7.2	0.174	131	0.422	3	5.023
136.84	-14.006	7.2	0.174	110	0.422	2	5.023
136.84	-14.006	7.1	0.174	141	0.422	3	32.88
136.84	-14.006	7.2	0.174	115	0.422	3	32.88

Month	Pred Losses	Rounded	Acc Losses	Error	Percent Error	Absolute Value	Avg % Error
Jun 86	102.99	103	102	1	0.98	0.98	21.0
Jul	63.10	63	82	-19	-23.17	23.17	
Aug	69.83	70	124	-54	-43.55	43.55	
Sep	71.85	72	105	-33	-31.43	31.43	
Oct	96.71	97	138	-41	-29.71	29.71	
Nov	68.63	69	75	-6	-8.00	8.00	
Dec	66.77	67	79	-12	-15.19	15.19	
Jan 87	85.85	86	81	5	6.17	6.17	
Feb	65.08	65	55	10	18.18	18.18	
Mar	61.00	61	72	-11	-15.28	15.28	
Apr	96.08	96	71	25	35.21	35.21	
May	90.15	90	72	18	25.00	25.00	

Twelve Month Projections

Sep12lin

Constant	Coeff	Un	Coeff	Nspd	Coeff	Spd	Qtr
114.92	-10.82	7.3	0.155	189	0.65	8	27.86
114.92	-10.82	7.3	0.155	94	0.65	5	13.11
114.92	-10.82	7.3	0.155	115	0.65	4	13.11
114.92	-10.82	7.1	0.155	125	0.65	11	13.11
114.92	-10.82	7.1	0.155	349	0.65	1	
114.92	-10.82	7.1	0.155	177	0.65	1	
114.92	-10.82	7	0.155	150	0.65	2	
114.92	-10.82	6.9	0.155	234	0.65	1	4.53
114.92	-10.82	6.8	0.155	137	0.65	2	4.53
114.92	-10.82	7.2	0.155	126	0.65	2	4.53
114.92	-10.82	7.2	0.155	147	0.65	1	27.86
114.92	-10.82	7.1	0.155	134	0.65	2	27.86

Month	Pred Losses	Rounded	Acc Losses	Error	Percent Error	Absolute Value	Avg % Error
Jun 86	98.29	98	102	-4	-3.92	3.92	20.1
Jul	66.86	67	82	-15	-18.29	18.29	
Aug	69.47	69	124	-55	-44.35	44.35	
Sep	77.73	78	105	-27	-25.71	25.71	
Oct	92.84	93	138	-45	-32.61	32.61	
Nov	66.18	66	75	-9	-12.00	12.00	
Dec	63.73	64	79	-15	-18.99	18.99	
Jan 87	81.71	82	81	1	1.23	1.23	
Feb	68.41	68	55	13	23.64	23.64	
Mar	62.38	62	72	-10	-13.89	13.89	
Apr	88.31	88	71	17	23.94	23.94	
May	88.03	88	72	16	22.22	22.22	

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